<ART-113-0>

SERVICE MANUAL

AM/FM STEREO TUNER

TX-9500

FV

NOTE:

MODEL TX-9500 COMES IN TWO VERSIONS DISTINGUISHED AS FOLLOWS:

Round label on rear panel	Voltage	Type
FV	110V, 120V, 130V, 220V and 240V (Switchable)	General export model
KCU	120V only	CSA (Canada) and UL (U.S.A.) approved

- If you want to see KCU type not described in this manual, you are requested to refer to the service manual furnished with KCU type (ART-106-0).

<75C02Y11H>

PIONEER®

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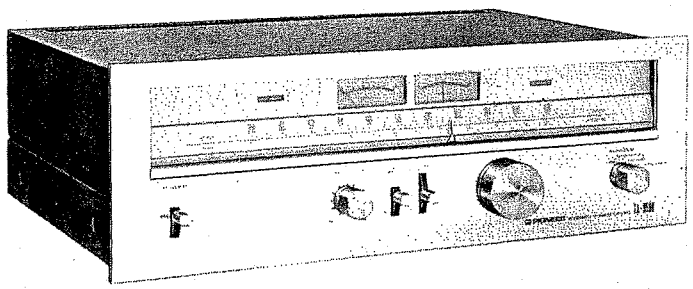


1. SPECIFICATIONS

Semiconductor

FET(s) 3
IC(s) 11
Transistors 34
Diodes 23

FM Section

Circuitry . . . . . 3 MOS FETs, 2-stage RF Amplifier 5-gang Variable Capacitor, 8-stage Limiter, PLL MPX Circuit.
Sensitivity
  IHF 1.5μV
  50dB Quieting . . . . . 2.5μV (mono), 35μV (stereo)
Signal-to-Noise Ratio . . . . . 80dB (mono), 75dB (stereo)
Total Harmonic Distortion
  100Hz . . . . . 0.15% (mono), 0.2% (stereo)
  1kHz . . . . . 0.15% (mono), 0.2% (stereo)
  10kHz . . . . . 0.15% (mono), 0.5% (stereo)
Capture Ratio 1.0dB
Selectivity ±400kHz 85dB
  ±300kHz 55dB
Frequency Response . . . . . 50Hz ~ 10kHz $^{+0.2}_{-0.5}$ dB
  20Hz ~ 15kHz $^{+0.2}_{-1.5}$ dB
Separation
  1kHz 40dB
  50Hz ~ 10kHz 35dB
Image Rejection 110dB
IF Rejection 110dB
Spurious Rejection 110dB
AM Suppression 55dB
Sub Carrier Suppression 65dB
Muting Threshold 5μV/22μV
Stereo Threshold 5μV
De-emphasis . . . . . 25μs/50μs/75μs switchable

AM Section

Circuitry . . . . . 1-stage RF Amplifier, 3-gang Variable Capacitor.
Sensitivity
  (IHF, Ferrite antenna) 300μV/m
  (IHF, Ext. antenna) 15μV
Selectivity 40dB
Signal-to-Noise Ratio 50dB
Image Rejection 65dB
IF Rejection 85dB

Audio Section

Output Level/Impedance
  FIXED 650mV/5kΩ
  VARIABLE . . . . . 70mV ~ 2V/3.5kΩ
  4CH MPX 400mV/2.5kΩ

Miscellaneous

Power Requirements . . . . . AC 110V, 120V, 130V, 220V, and 240V (Switchable) 50/60Hz
Power Consumption 23W
Dimensions . . . . . 420(W) x 150(H) x 365(D)mm
  16-9/16 x 5-7/8 x 14-3/8 in.
Weight: Without Package . . . . . 9.1kg (20 lb 1 oz)
  With Package . . . . . 10.6kg (23 lb 5 oz)

Furnished Parts

FM T-type Antenna 1
Connection Cord with Pin Plugs 1
Operating Instructions 1
Hexagonal wrench 1
Fuse 1A 1
Fuse 0.5A 1

NOTE:
Specifications and the design subject to possible modification without notice due to improvements.

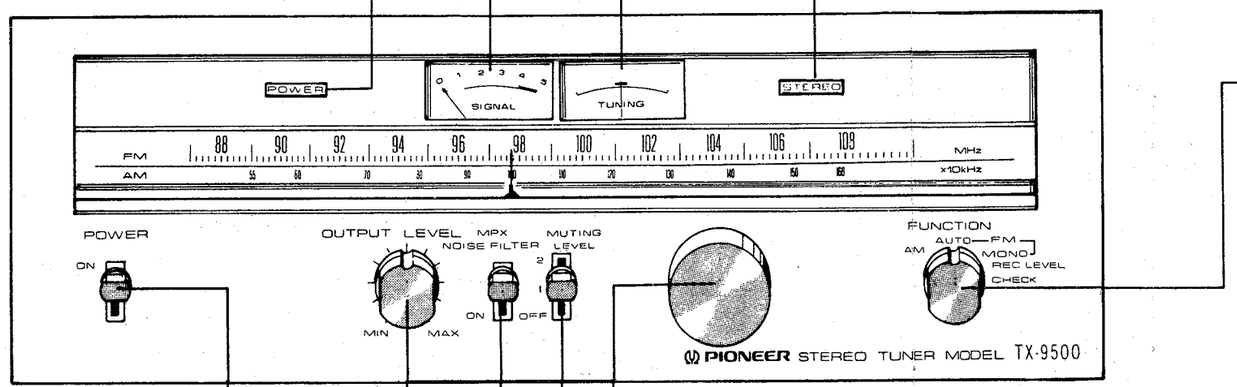
2. FRONT PANEL FACILITIES

SIGNAL METER
Tune for maximum deflection toward the right when selecting AM or FM station.

PILOT LAMP
Lights to indicate AC power ON.

TUNING METER
When selecting FM stations, tune for maximum rightward deflection of the SIGNAL meter and center indication of this meter.

FM STEREO INDICATOR
With the FUNCTION switch set to FM AUTO, the STEREO inscription lights while an FM stereo station is being received.



FUNCTION SWITCH
Selects type of reception.

AM:	For receiving AM stations
FM AUTO:	For FM stereo reception. Automatically receives monophonically during FM monophonic broadcasts. The STEREO indicator lights while FM stereo is being received.
FM MONO:	For monophonic FM reception
REC LEVEL CHECK:	Signal (level corresponding to 50% FM modulation) is produced at approximately 1.3 second intervals for setting the recording level of a tape deck connected directly or through a stereo amplifier.

TUNING KNOB
Knob for selecting stations. Tune for optimum reception while observing the SIGNAL meter for AM stations, and both SIGNAL and TUNING meters for FM stations.

POWER SWITCH
Switch for turning AC power ON and OFF

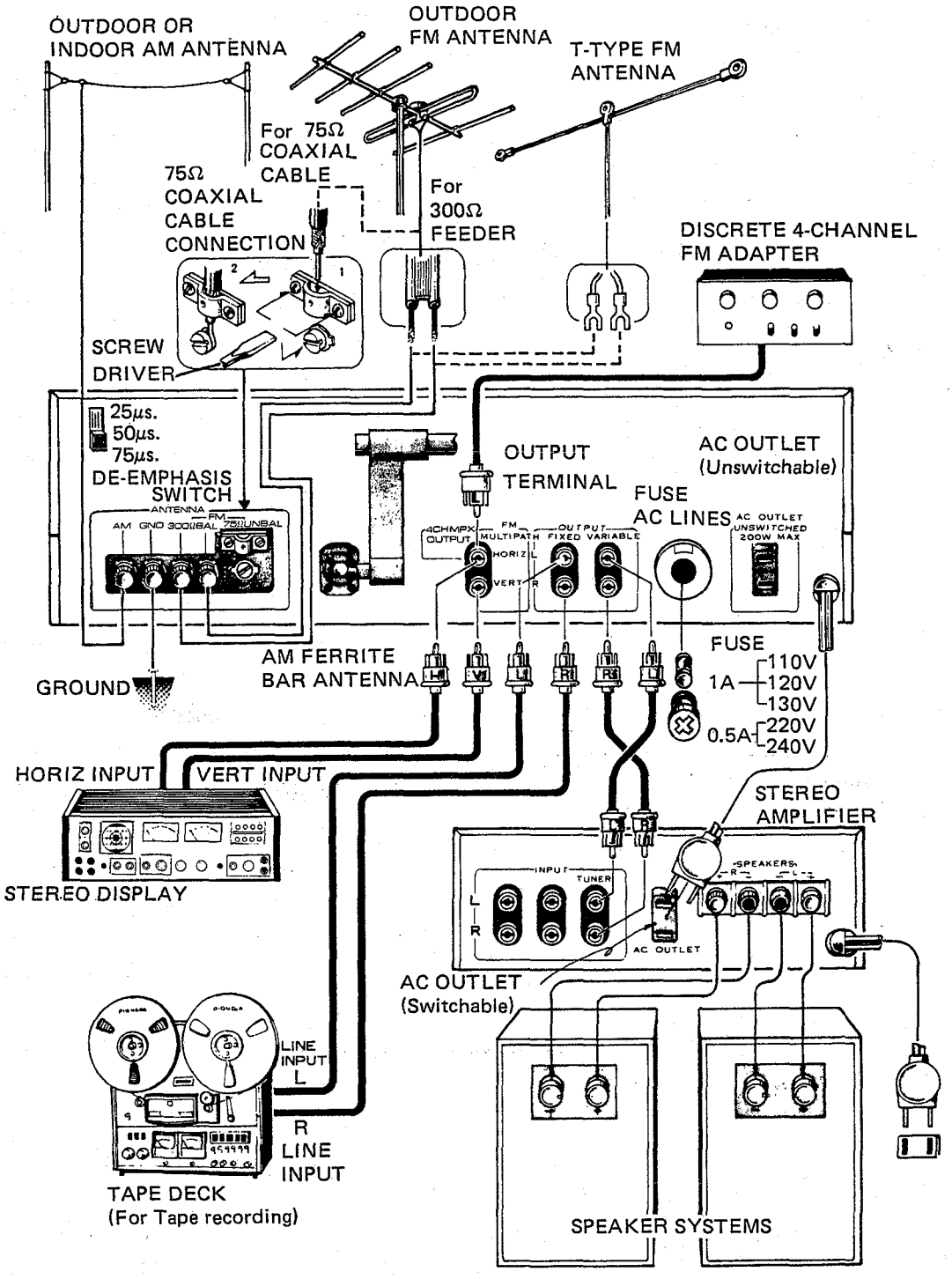
MUTING LEVEL SWITCH
Eliminates bothersome inter-station noise when tuning FM stations.

2:	For receiving only strong stations
1:	When desired station is suppressed by setting 2. Set to this position normally.
OFF:	For very weak reception areas.

OUTPUT LEVEL CONTROL
Adjusts the output level at the OUTPUT (VARIABLE) jacks. Clockwise rotation increases the level.

MPX NOISE FILTER SWITCH
Comparatively high frequency noise incurred when receiving weak FM stereo signals can be cut by setting this switch to ON. In this case, however, there will be some loss of stereo separation.

3. CONNECTION DIAGRAM



4. DISASSEMBLY

Bonnet Case

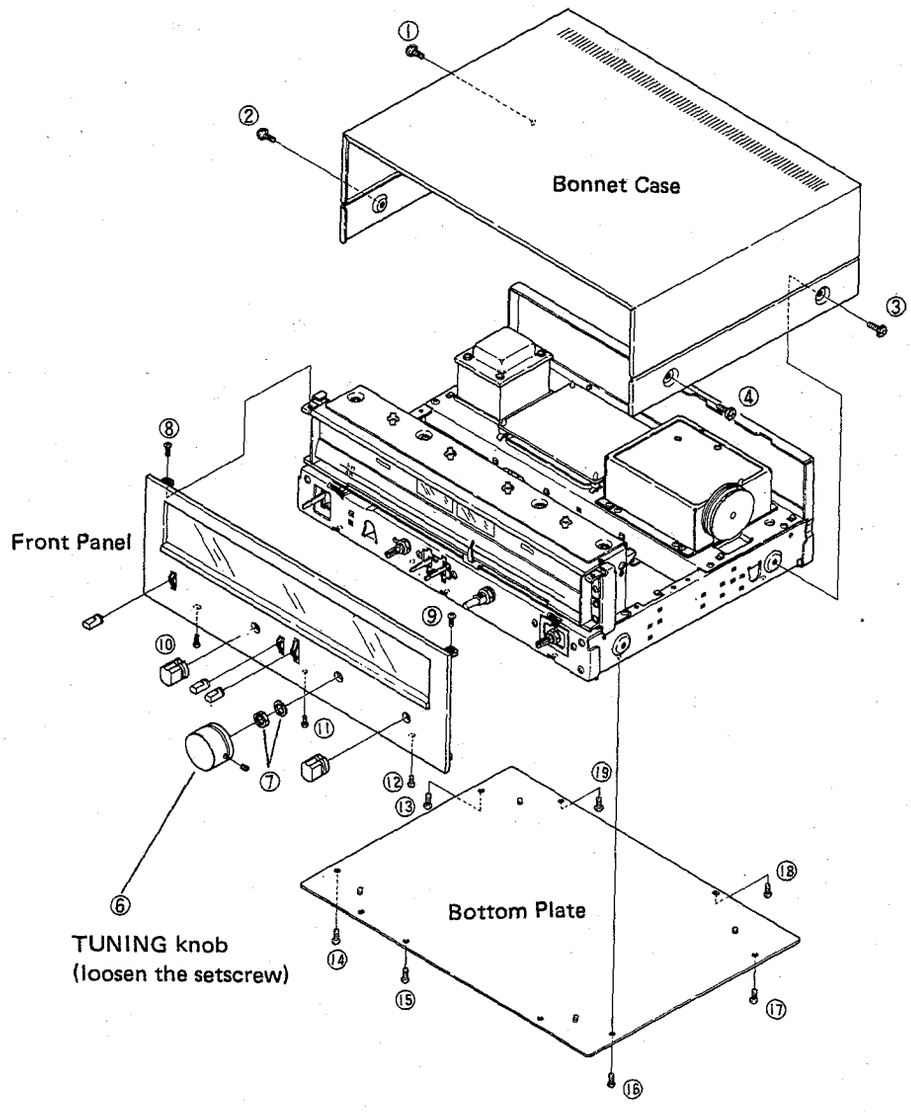
Unscrew the four screws (① ~ ④). Lift up the Bonnet case.

Bottom Plate

Unscrew the seven screws (⑬ ~ ⑲). Take off the bottom plate.

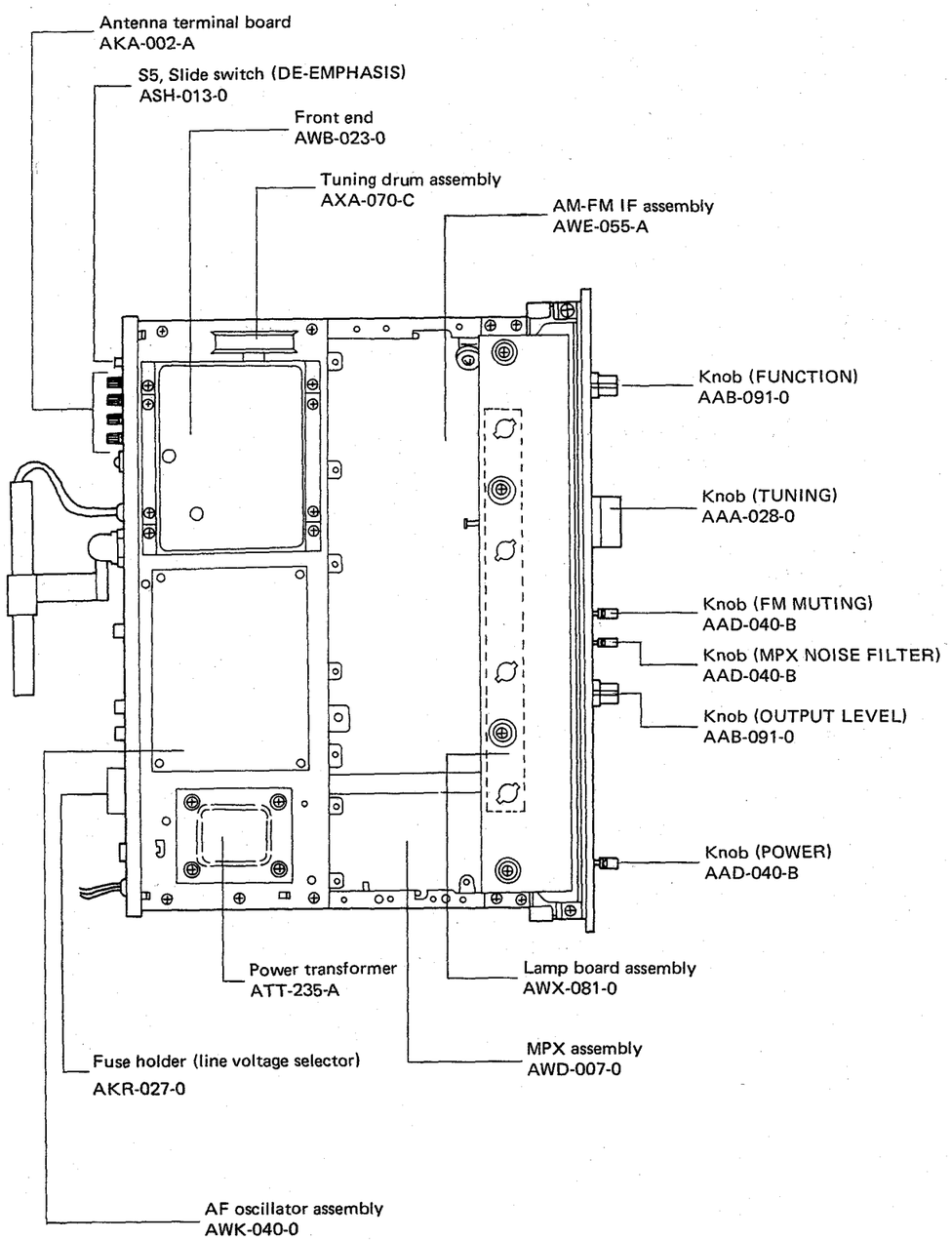
Front Panel

Remove all front panel knobs. For TUNING knob, loosen the setscrew with a hexagonal wrench before removing it. Unscrew the five screws (⑧ ~ ⑫). Remove the TUNING shaft nut and washer. The front panel is ready for removal.

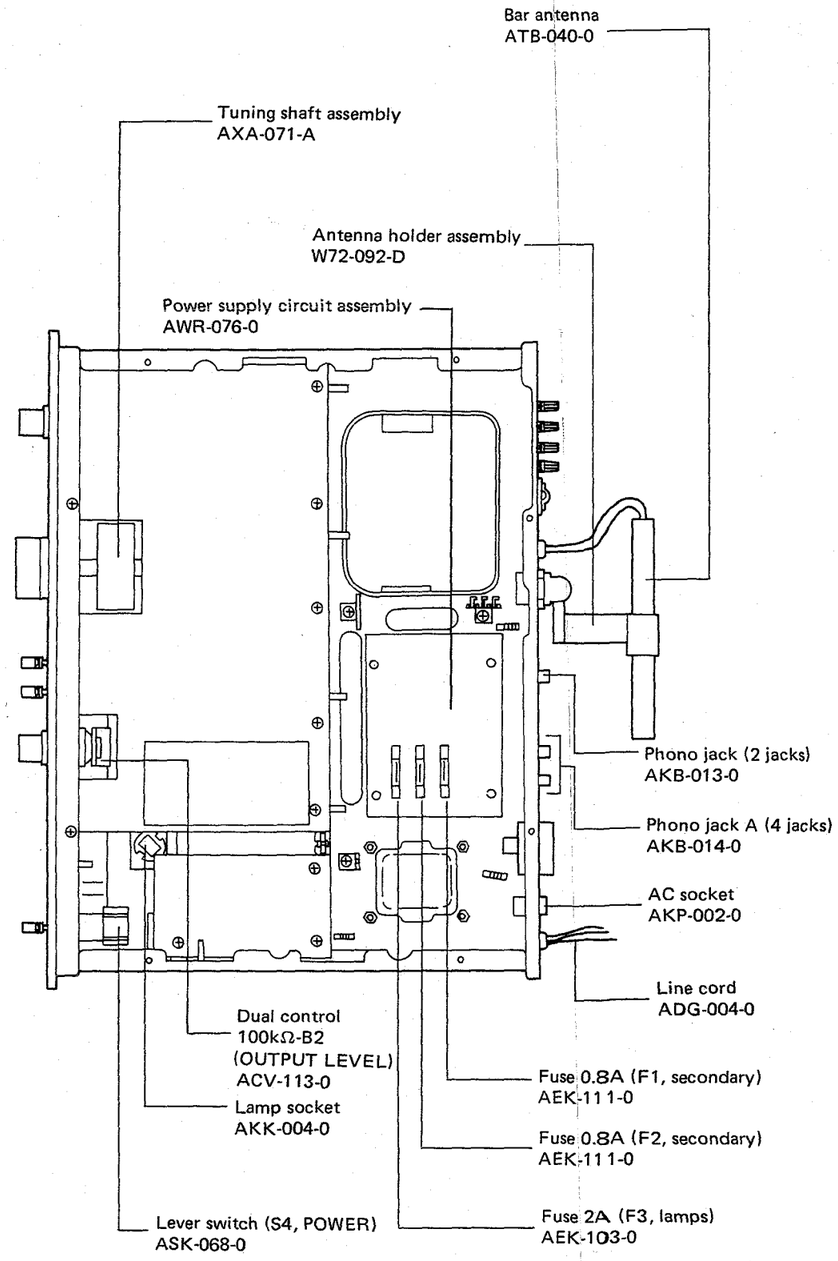


5. PARTS LOCATION

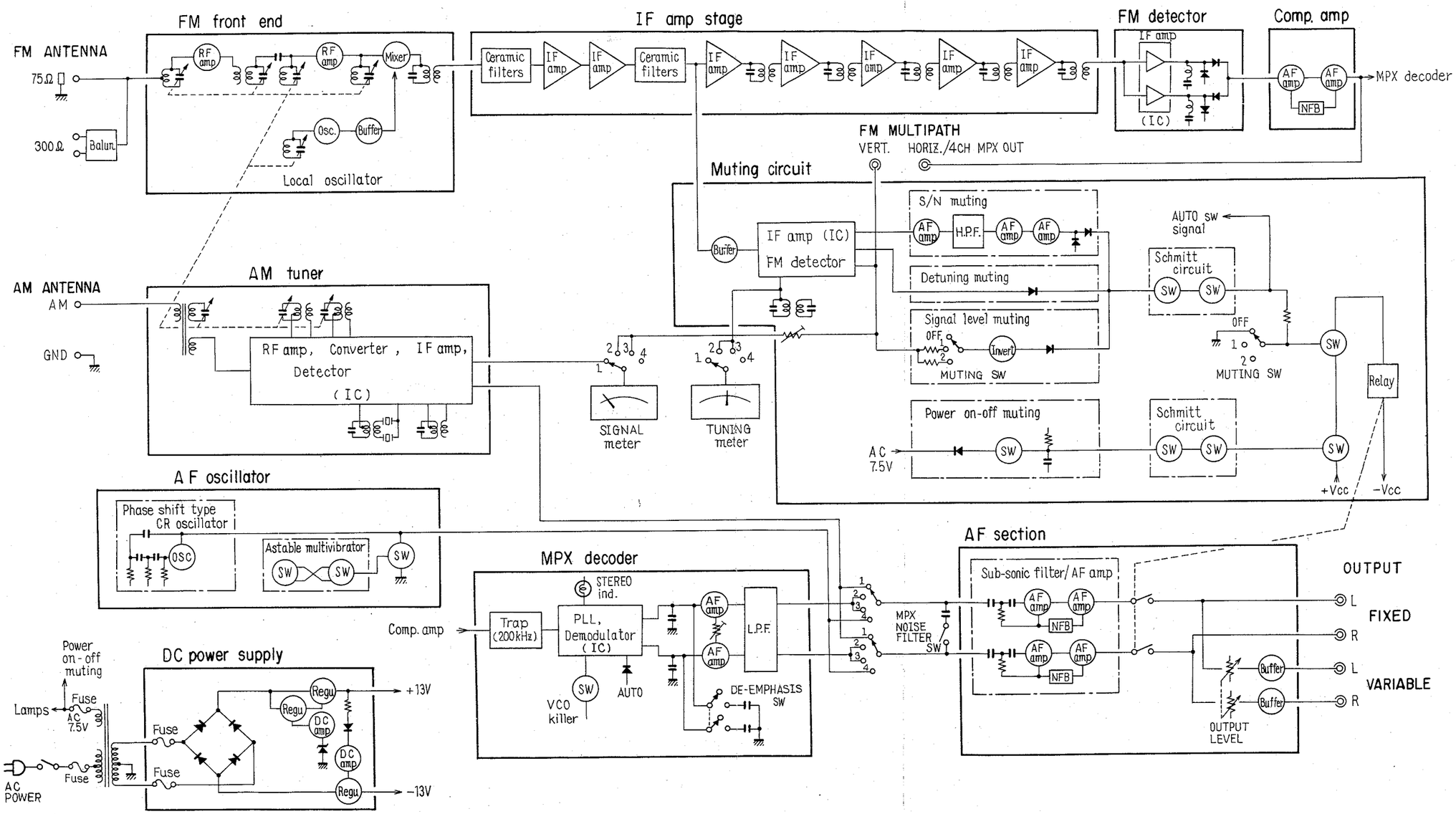
Top View



Bottom View



6. BLOCK DIAGRAM



7. CIRCUIT DESCRIPTION

FM Front End

This comprises a tuning circuit with a 5-gang variable capacitor, a two-stage RF amplifier and a local oscillator with buffer.

- **RF amplifier**

This uses a dual-gate MOS field effect transistor and is equivalent to a cascode amplifier with two ordinary MOS FETs due to the employed circuitry that the FET's gate-2 is grounded. This has resulted in a stable RF amplification with large gain.

- **Mixer**

A dual-gate MOS FET is used in such a manner that the RF amplifier's output, coming to the gate-1, is mixed with the signal from the local oscillator applied to the gate-2.
This method has advantages that no big power signal from the local oscillator is needed and there is a least mutual interference even when the input level is very high.

- **Local oscillator**

This is a variation of the Clapp circuit.
A buffer amplifier is provided between the mixer and local oscillator to ease its load so that the distortion of the oscillator's output is kept minimum and, at the same time, to protect the local oscillator from being affected by the mixer.

FM IF Amplifier

This comprises 7 monolithic integrated circuits (ICs), 4 dual element ceramic filters and 5 single-tuned intermediate frequency transformers (IFTs) and has a wide frequency response as well as a satisfactory limitter characteristics.

FM Detector (Figs. 1, 2, 3)

This is a newly-developed delay-type ultra wide-band linear phase detector. The linearity of detection extends up to about ±3MHz while it has superb differential characteristics. However, the limiter must be effectively provided in the IF stage because this circuit has no facility of amplitude suppression.

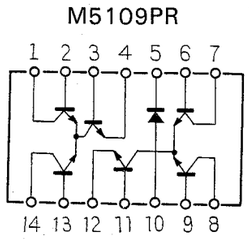


Fig. 1

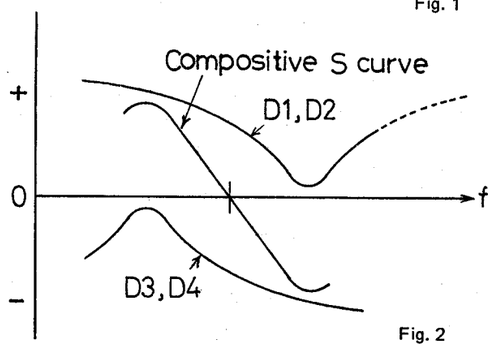


Fig. 2

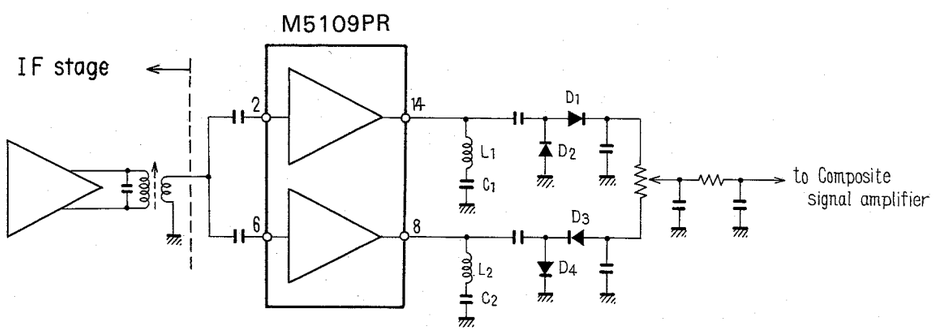


Fig. 3

The M5109PR is an IC in which two pairs of differential amplifiers are incorporated (Fig. 1). The load of each differential amplifier is a series resonance circuit. The frequency deviation of the modulated signal from the intermediate frequency (10.7MHz) is converted to amplitude-modulated wave, making use of a characteristic slope of each resonance circuit, which is symmetrically detected into two components and finally composed into one (Fig. 2).

MPX Decoder (Fig. 4)

This is of the phase locked loop (PLL) circuit which is integrated into an IC (HA1156).

AM Tuner (Fig. 5)

This consists of an IC (HA1138) which performs single-stage RF and double-stage IF amplifications.

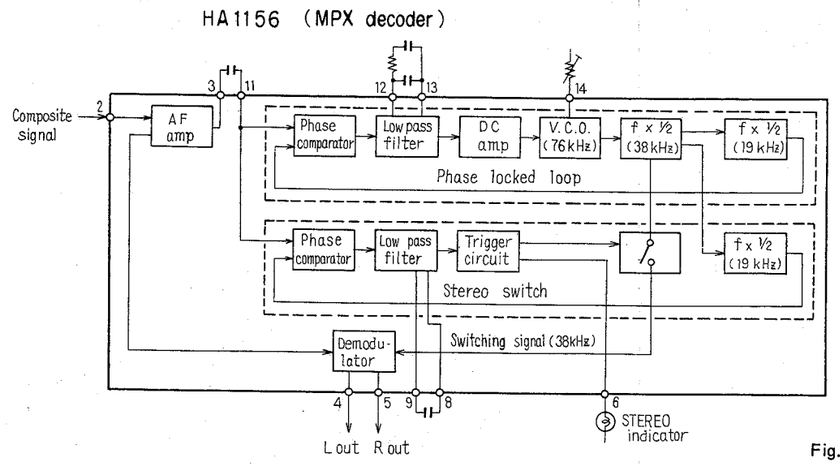


Fig. 4

***Voltage Control Oscillator (VCO)**

This is an oscillator of which oscillation frequency can be controlled by the input voltage. The free-running frequency, which is the natural frequency when there are no input signals, is adjusted to 76kHz.

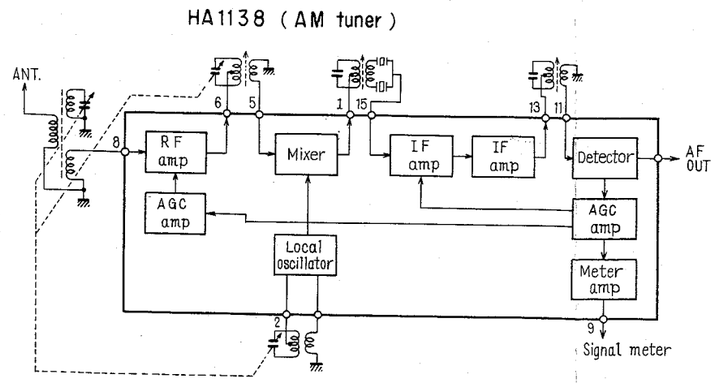


Fig. 5

Muting Circuit (Fig. 6)

The TX-9500 is provided with the IF amplifier and detector exclusively used for the FM muting, which are integrated into an IC (HA1137).

- **S/N Muting**

This starts functioning, when the signal-to-noise ratio has deteriorated.
The components of 100kHz and over of the detected signal (pin 6 of HA1137), being taken as noise signals, are amplified (Q1~Q3) and rectified (D1 and D2) before being applied to the Schmitt circuit to make the muting relay operate (off).

- **Input level muting**

This operates when the level of input signal is too low.
The operation level of this muting can be switched over two levels with the front panel MUTING switch. DC voltages, which develop at pin 13 of the HA1137 and are almost proportional to the levels of antenna input signals, are inverted at Q4 (i.e. in inverse proportion) and applied to the Schmitt circuit (Q5 and Q6) to make the muting relay (RL1) operate (off).

- **Detuning muting**

This operates when the tuner has been detuned. A DC voltage, which is available at pin 12 of the HA1137 when the tuner has been detuned by about 70kHz, is sent to the Schmitt circuit to make the muting relay (RL1) operate (off).

- **Power switch muting**

This operates to keep click noises low when turning on and off the power.
When 7.5V AC voltage is supplied with the power turned on, the collector potential of Q9 which has just been switched off rises as C1 becomes more and more charged until the Schmitt circuit is reversed to make the muting relay (RL1) operate (on). When turning off the power has stopped supplying 7.5V AC voltage, the base potential of Q9 rises temporarily. It will switch on Q9 and the electricity stored in C1 will discharge instantaneously resulting in reversal of the Schmitt circuit, which causes the muting relay to operate (off).

AF Oscillator

This is a phase shift type CR oscillator which supplies the REC LEVEL CHECK signal by generating 440Hz sine waves and switching them at 1.3 second intervals with an astable multivibrator.

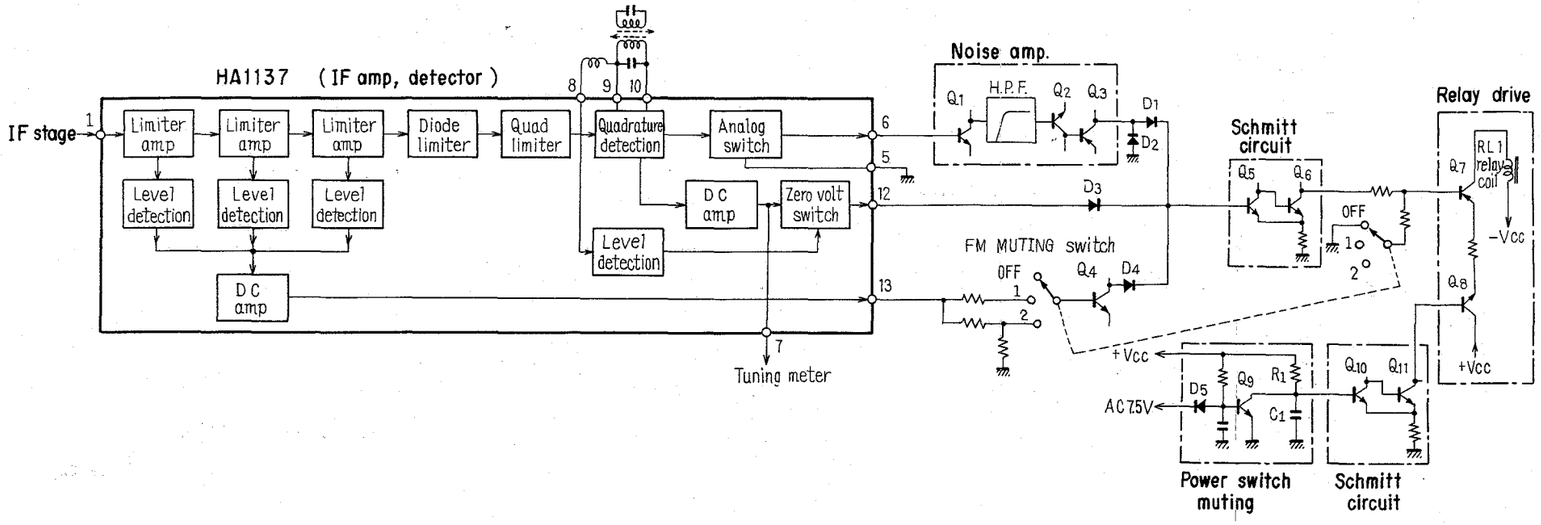


Fig. 6

8. ADJUSTMENTS

Before starting adjustment, make sure that the dial pointer indicates the left hand end of the frequency scale (the lowest frequency position) when the tuning knob is turned fully counter-clockwise.

8.1 ADJUSTMENT OF FM SECTION

Caution:
Do not touch the IF transformers (T1 ~ T5) in the AM-FM IF assembly.

FM front end

Switch positions:
FUNCTION switch: FM MONO
MPX NOISE FILTER switch: OFF
FM MUTING switch: OFF

Connection of instruments:
FM signal generator (FM SG): Connect to the FM ANTENNA terminals through a 300-ohm dummy antenna.
AC voltmeter (with the maximum indication of about 1V): Connect to the FIXED L terminal.

Adjustment
1. Position the dial pointer of the TX-9500 at 90MHz.
2. Set the FM SG's output to 90MHz, 10dB with 100% modulation by 400Hz.
3. Adjust T5 so that the AC voltmeter reads a maximum.
4. Reset the TX-9500's dial pointer and the FM SG's output frequency to 106MHz (leaving the output level and degree of modulation as it is).
5. Adjust TC5 so that the AC voltmeter reads a maximum.
6. Reset the TX-9500's dial pointer and the FM SG's output frequency to 90MHz (leaving the output level and degree of modulation as it is).
7. Adjust T1, T2, T3 and T4 so that the AC voltmeter reads a maximum.
8. Reset the TX-9500's dial pointer and the FM SG's output frequency to 106MHz (leaving the output level and degree of modulation as it is).
9. Adjust TC1, TC2, TC3 and TC4 so that the AC voltmeter reads a maximum.
10. Repeat 1 to 9 until the AC voltmeter reads almost the same indications for 90MHz and 106MHz.
11. Resetting the FM SG's output level to 10dB, adjust T6 so that the AC voltmeter reads a maximum.

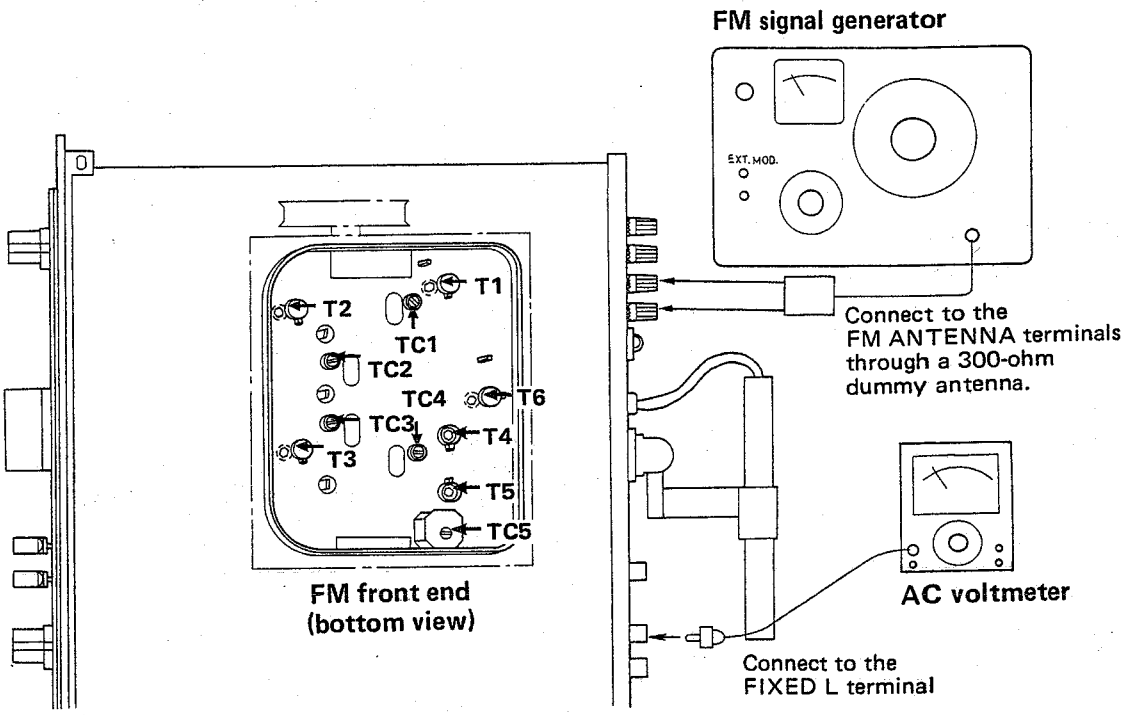


Fig. 7

Muting circuit

Switch positions:
FUNCTION switch: FM MONO
MPX NOISE FILTER switch: OFF
MUTING switch: OFF

Connection of instruments:
FM signal generator (FM SG): Connect to the FM ANTENNA terminals through a 300-ohm dummy antenna.
AC voltmeter (with the maximum indication of about 1V): Connect to the FIXED L terminal.
Distortion meter: Connect to terminal No.12 of the AM-FM IF assembly.

Adjustment

1. Turn VR1 fully counterclockwise.
2. Setting the TX-9500 to a condition, by reducing the FM SG's output level (less than —6dB) or detuning the TX-9500, such that it is receiving no input signals, adjust the primary (lower) core of T6 so that the TUNING meter points to the center of the scale.
3. Resetting the FM SG's output level to 60dB, adjust the secondary (upper) core of T6 so that distortion becomes minimum.
4. Set the FM SG's output to 98MHz, 20dB with 100% modulation by 400Hz.
5. Tune the TX-9500 to 98MHz (Make a fine tuning looking at the TUNING meter).
6. Set the MUTING switch at "1."
7. Turn VR1 clockwise slowly and stop it just when the AC voltmeter abruptly indicates 0V.
8. Reset the MUTING switch "OFF".
9. Setting the TX-9500 to a condition, by reducing the FM SG's output level (less than —6dB), such that it is receiving no input signals, adjust the primary (lower) core of T6 so that the TUNING meter points to the center of the scale.
10. Repeat 8 to 9 for several times.
11. Resetting the FM SG's output level to 100dB, adjust VR2 so that the SIGNAL meter points to "5."

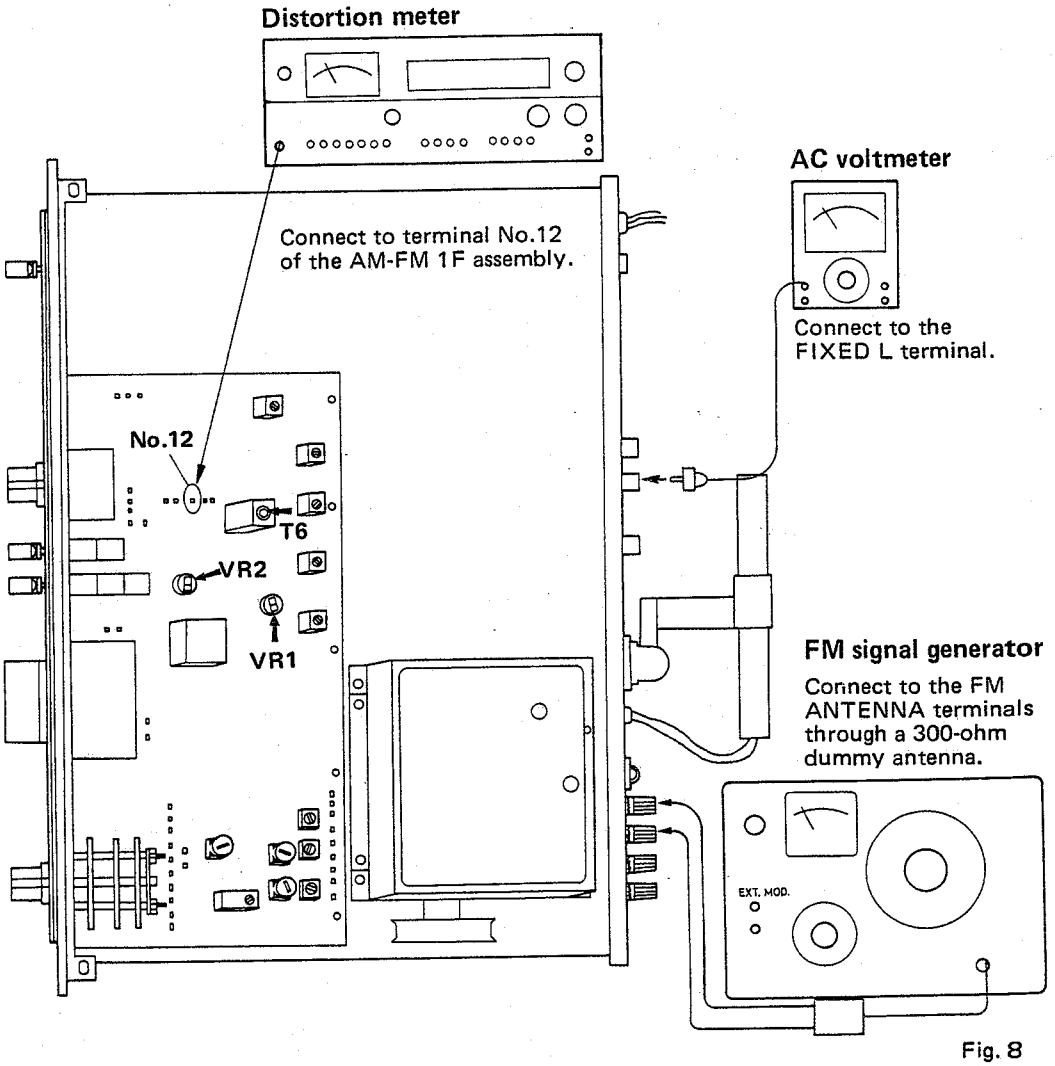


Fig. 8

FM MPX circuit

Switch positions:

FUNCTION switch: FM AUTO
MPX NOISE FILTER: switch: OFF
MUTING switch: OFF

Connection of instruments:

FM signal generator (FM SG): Connect to the FM ANTENNA terminals through a 300-ohm dummy antenna.
MPX signal generator (MPX SG): Connect to the "external modulation" terminals of FM SG.
AC voltmeter: Connect to the FIXED L terminal.
Oscilloscope: Connect the horizontal and vertical input terminals respectively to the MPX SG's PILOT OUT terminal and No.11 terminal of the MPX assembly through a probe.

Adjustment

1. Set the FM SG's output to 98MHz, 60dB with 0% modulation.
2. Tune the TX-9500 to 98MHz. (Make a fine tuning looking at the TUNING meter.)
3. Adjust VR1 so that the Lissajous' figure developed on the oscilloscpe screen becomes stationary.
4. Reset the FM SG's output to 98MHz, 60dB with external modulation and make the MPX SG generate the pilot and R channel signals.
5. Adjust VR2 so that the AC voltmeter reads minimum.

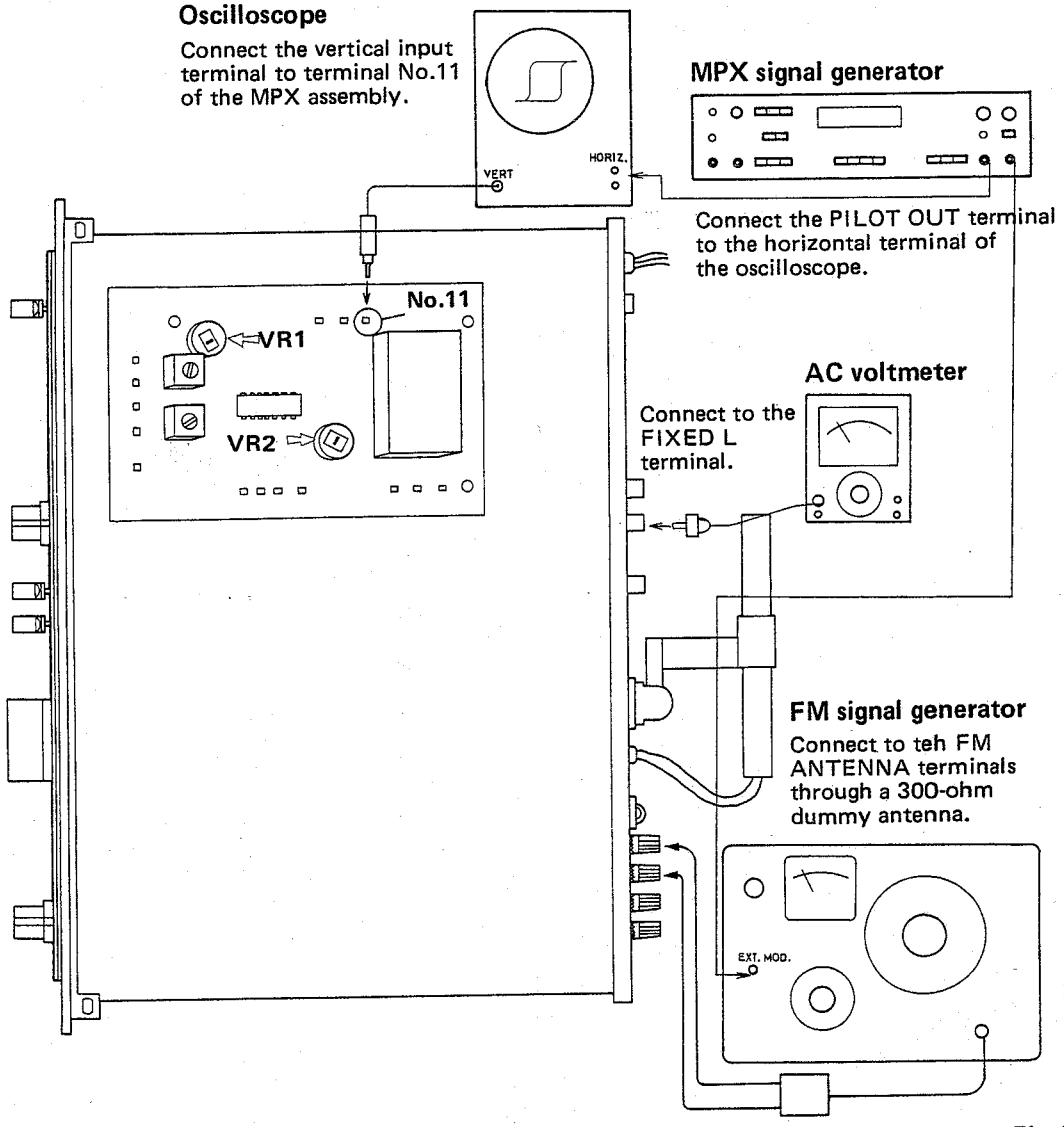

Oscilloscope
Connect the vertical input terminal to terminal No.11 of the MPX assembly.
VERT
HORIZ.
MPX signal generator
Connect the PILOT OUT terminal to the horizontal terminal of the oscilloscope.
No.11
VR1
VR2
AC voltmeter
Connect to the FIXED L terminal.
FM signal generator
Connect to teh FM ANTENNA terminals through a 300-ohm dummy antenna.
EXT. MOD.

Fig. 9

8.2 ADJUSTMENT OF AM SECTION

Adjustment of IFT

Switch positions:
FUNCTION switch: AM

Connection of instruments:
Sweep generator (400kHz ~ 500kHz): Connect the output terminal to No.2 terminal of the AM-FM IF assembly.
Oscilloscope: Connect the vertical and horizontal input terminals respectively to the TX-9500's FIXED L terminal and the sweep generator's time axis output terminal.

Adjustment
1. Set the sweep generator output level to 80dB.
2. Adjust F5 and T9 so that the figure developed on the oscilloscope becomes laterally symmetrical with the axis of symmetry at 455kHz and it has a maximum amplitude as well.

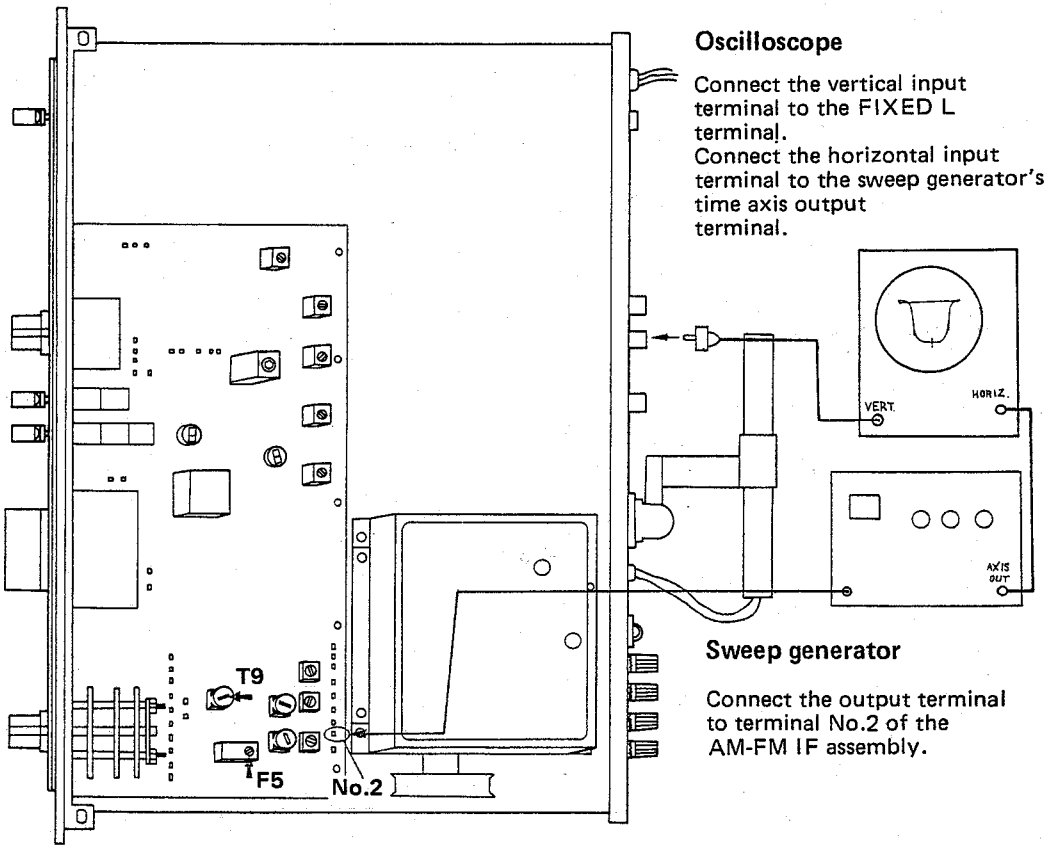

Oscilloscope
Connect the vertical input terminal to the FIXED L terminal.
Connect the horizontal input terminal to the sweep generator's time axis output terminal.
VERT.
HORIZ.
AXIS OUT
T9
F5
No.2
Sweep generator
Connect the output terminal to terminal No.2 of the AM-FM IF assembly.

Fig. 10

• Tracking adjustment

Switch position:
FUNCTION switch: AM

Connection of instruments:
AM signal generator (AM SG): Connect to the AM ANTENNA terminals through a 1k-ohm resistor.
AC voltmeter: Connect to the FIXED L terminal.

Adjustment

1. Position the TX-9500's dial pointer at 600kHz.
2. Set the AM SG's output to 600kHz, 30dB with 30% modulation by 400Hz.
3. Adjust the cores of T8, T7 and the bar antenna so that the AC voltmeter reads maximum.
4. Reset the TX-9500's dial pointer and the AM SG's output frequency to 1,400kHz (leaving the output level and degree of modulation as it is set).
5. Adjust TC1, TC2 and TC3 so that the AC voltmeter reads maximum.
6. Repeat 1 to 5 until the AC voltmeter reads almost the same indications for 600kHz and 1,400kHz.

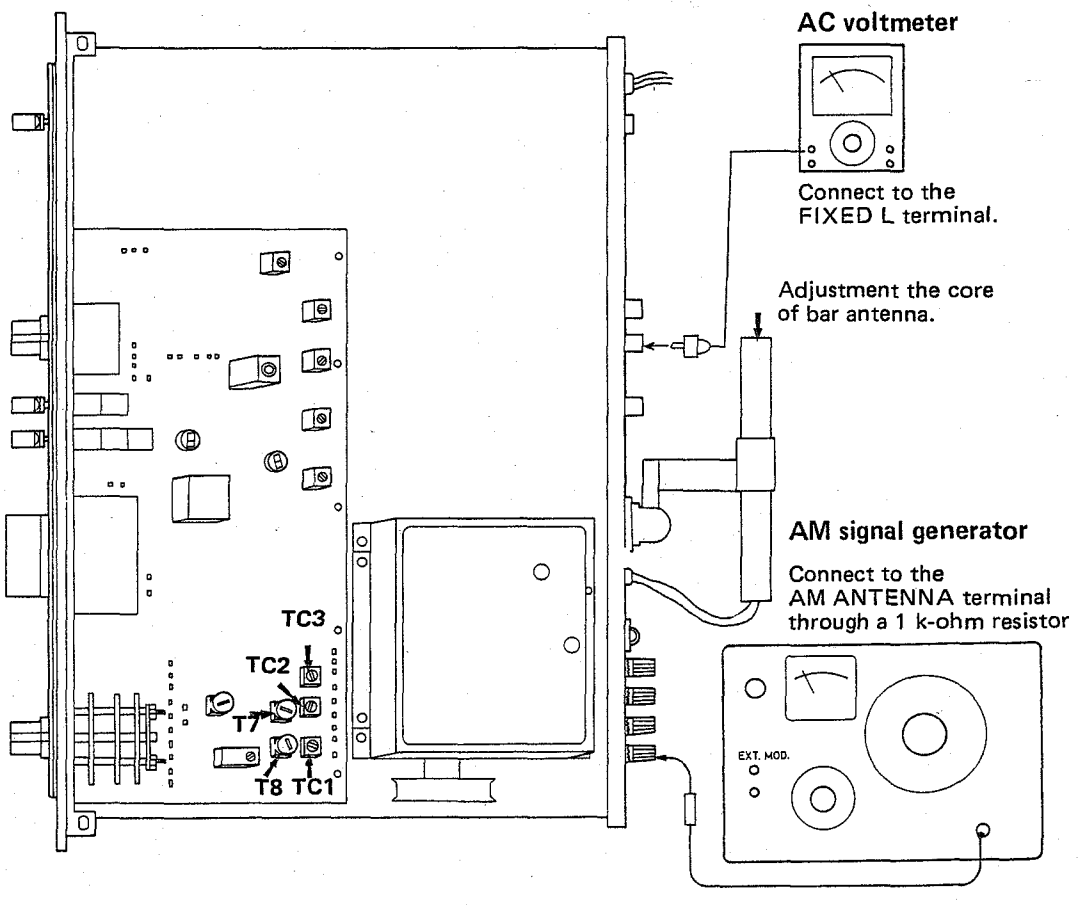


Fig. 11

8.3 ADJUSTMENT OF AUDIO FREQUENCY OSCILLATOR

Switch position:
FUNCTION switch: REC LEVEL CHECK

Connection of instrument:
AC voltmeter: Connect to the FIXED L terminal.

1. Make sure that the AC voltmeter deflects intermittently.
2. Adjust VR1 so that the AC voltmeter reads half of the rated output.*

* The output level of audio signal when the TX-9500 is receiving FM signals of 60dB with 100% 400Hz modulation.

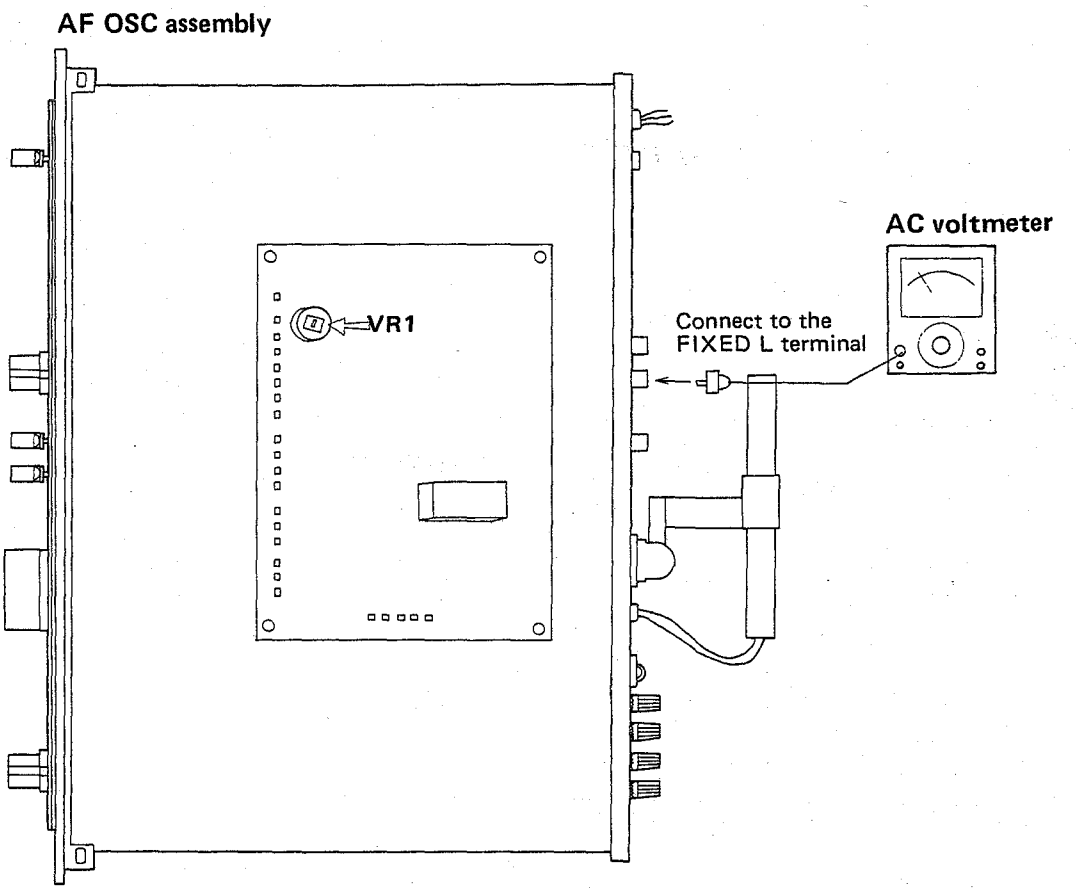
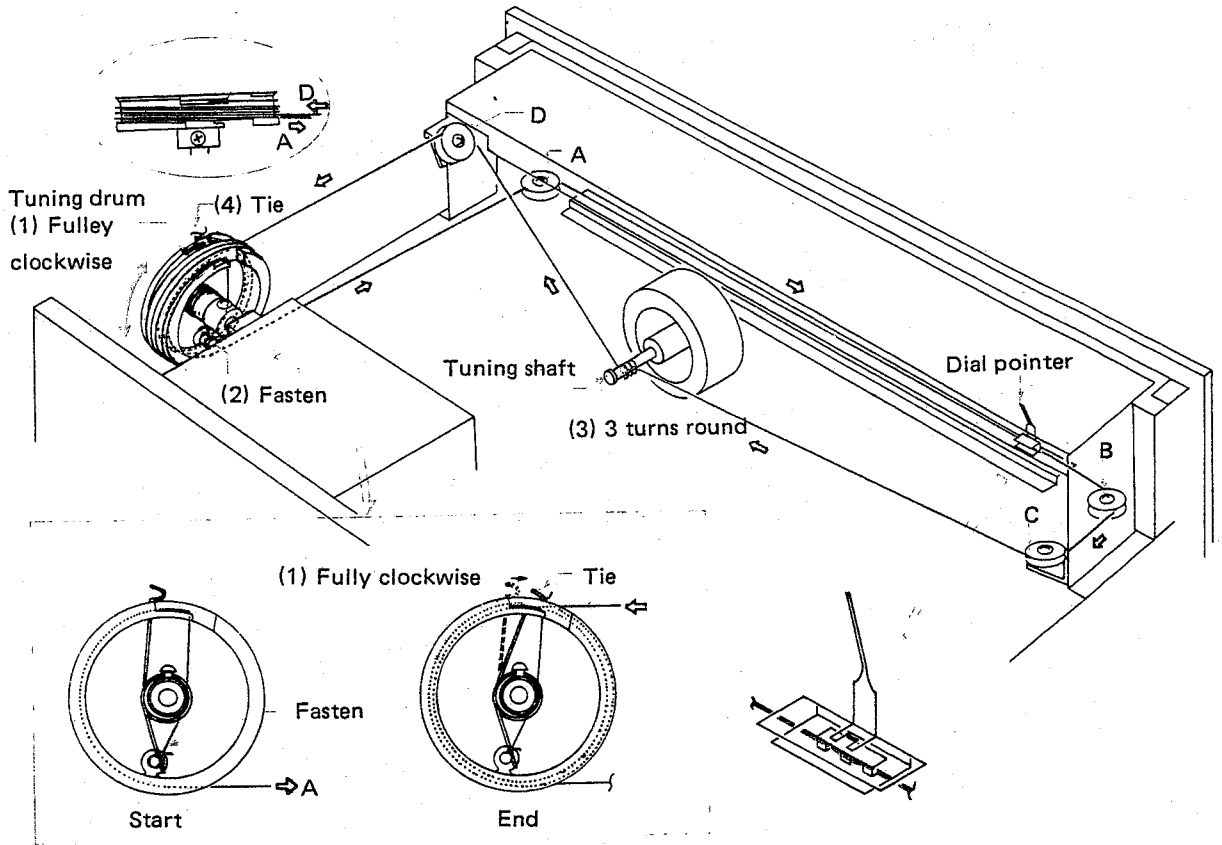


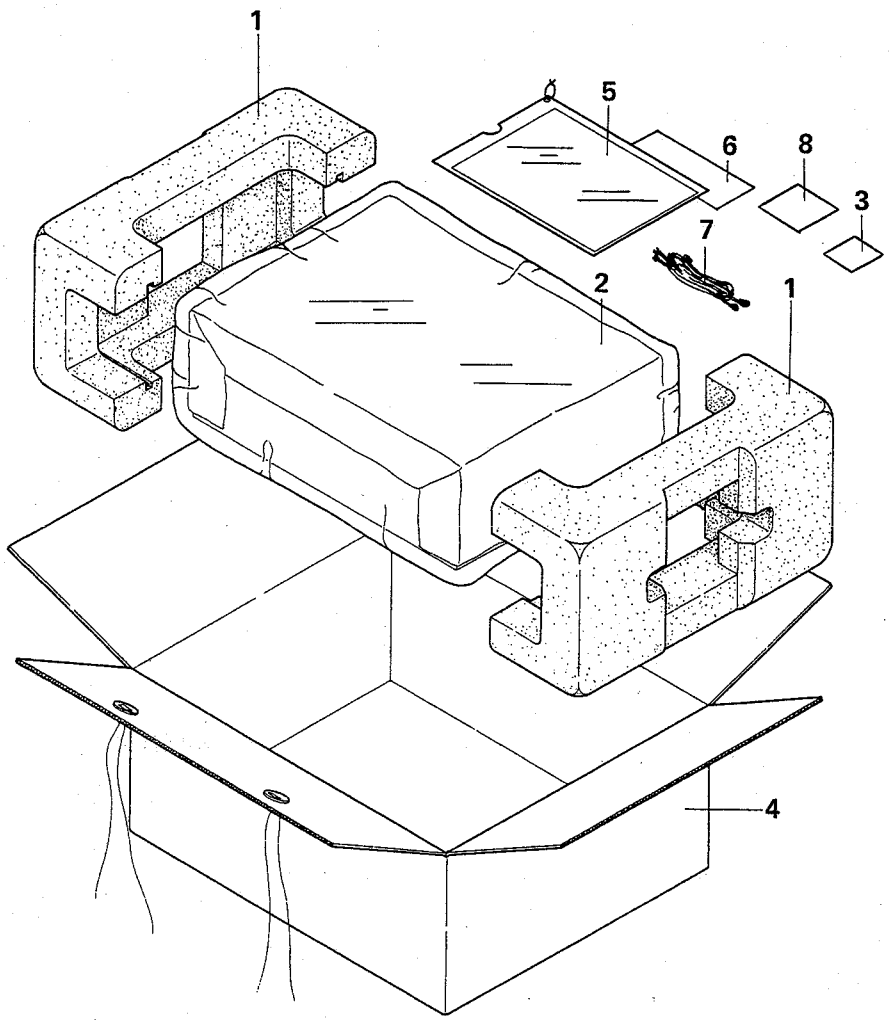
Fig. 12

9. DIAL CORD STRINGING

1. Set the tuning capacitor to maximum capacitance, fully clockwise.
2. Fasten one end of the cord to the protrusion on the tuning drum and lead it round pulleys A, B and C.
3. Wind the cord 3 turns round the tuning shaft and run it round pulley D.
4. Wind the cord 2 turns round the dial pulley and tie the end to the spring while tensioning the spring slightly.
5. Confirm that dial stringing moves smoothly. If so, cut the unnecessary portion of string.
6. Turn the tuning knob fully counterclockwise and fix the dial pointer to string so that it indicates low end on the dial scale.



10. PACKING



Parts List

Key No.	Description	Part No.	
1	Side pad	AHA-081-0	
2	Sheet	AHG-026-B	
3	Hexagonal wrench	ANK-018-0	
4	Packing case	AHD-249-0	
5	Operating instructions (English)	ARB-148-0	
	Operating instructions (German/French)	ARD-082-0	
6	Connection cord with pin plugs	ADE-005-0	
7	FM T-type antenna	ADH-002-0	
8	Fuse 1A	AEK-106-0	
	Fuse 0.5A	AEK-107-0	

11. EXPLODED VIEW AND PARTS LIST

NOTE
Parts number is subject to change for the purpose of improvement with notice of a service bulletin.
Service bulletin will be furnished whenever necessary and you are requested to amend parts number in this manual according to the instructions.

Parts List of Exploded View

NOTICE: Any parts asterisked (*) are subject to being not supplied.

Key No.	Description	Part No.	
1*	Lamp board mount plate	ANH-250-A	
2*	Acrylic board clip	AEC-036-A	
3*	Acrylic board	AEC-192-B	
4	Pulley shaft	M49-025-E	
5	Pulley	AEC-101-0	
6*	Pulley-held metal	ANG-115-0	
7	Dial panel assembly	AAG-089-A	
8*	Side screen (L)	AAH-020-0	
9*	Dial pointer guide plate	ANK-077-0	
10	Dial pointer	AAF-040-0	
11*	Nylon sheet	AEC-191-0	
12*	Side screen (R)	AAH-021-0	
13	Rubber bracket	AEB-068-0	
14	Lamp 6V, 30mA (with leads)	AEL-025-0	
15	Double meter (SIGNAL/TUNING)	AAW-040-0	
16*	Hold plate	ABK-003-0	
17	Power transformer	ATT-235-A	
18*	PC board spacer	AEB-019-0	
19*	Dial stay	AND-084-A	
20*	Pulley-held metal	ANG-014-A	
21	AF oscillator assembly	AWK-040-0	
22	Lamp socket (wedge type)	AKK-004-0	
23	Lamp 8V, 300mA (wedge type)	AEL-029-0	
24	Lamp board assembly	AWX-081-0	
25	Front end	AWB-023-0	
26	Collar head tapping screw 4x8	ABA-079-A	
27	Dial drum assembly	AXA-070-C	
28	Strain relief	AEC-079-0	
29	Line cord	ADG-004-0	
30	Bonnet	ANE-079-0	
31	Bar-antenna	ATB-040-0	
32	Antenna holder assembly	W72-092-D	
33	Tapping screw M3x8	ABA-002-0	
34*	Rear panel	ANC-188-0	
35	AC socket	AKP-002-0	
36*	Socket mount plate	M49-127-0	
37*	Wire clip (B)	AEC-005-0	
38	Phono jack A (4 jacks)	AKB-014-0	
39	Phono jack (2 jacks)	AKB-013-0	
40	Antenna terminal board	AKA-002-A	

Continued on the Next Page

NOTICE: Any parts asterisked (*) are subject to being not supplied.

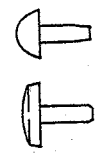
Key No.	Description	Part No.	
41	Ferrite balun	T22-025-A	
42*	Center frame	ANA-083-C	
43*	Side frame	ANF-303-0	
44	Ground terminal 4P	K13-047-0	
45*	Wire clip (S)	AEC-037-0	
46	Ground terminal 2P	K13-048-0	
47*	Wire supporter	AEC-151-B	
48	Lever switch (S4, POWER)	ASK-068-0	
49	Dual control 100kΩ-B2 (OUTPUT)	ACV-113-0	
50	Tuning shaft assembly	AXA-071-A	
51*	Front frame	ANA-082-0	
52	Flat washer 9ϕ	B22-016-0	
53	Hex. nut 9ϕ	B71-004-0	
54	Flat washer 11ϕ	B22-017-0	
55	Hex. nut 11ϕ	B71-005-0	
56	Front panel assembly	ANB-313-A	
57	Knob (POWER, MPX NOISE FILTER, FM MUTING)	AAD-040-B	
58	Knob (OUTPUT LEVEL, FUNCTION)	AAB-091-0	
59	Knob (TUNING)	AAA-028-0	
60	MPX assembly	AWD-007-0	
61	Collar head tapping screw M3x8	ABA-078-A	
62	Fuse 2A (F3, lamps)	AEK-103-0	
63	Fuse 0.5A (F4, primary)	AEK-107-0	
64	Power supply circuit assembly	AWR-076-0	
65	AM-FM IF assembly	AWE-055-A	
66	Foot	AEC-178-0	
67*	Bottom plate	ANE-078-C	
68	Tapping screw 4x8	ABA-012-0	
69	Fuse 0.8A (F1, F2 secondary)	AEK-111-0	
70	Round head screw M3x10	ABA-003-0	
71	Pan head screw M3x6 (pit-shaped)	B11-037-0	attach 27
72	Set screw M3x4	.....	attach 59
73	Slide switch (S5, DE-EMPHASIS)	ASH-013-A	
74*	Lock plate	AEC-199-0	
75	Fuse holder (line voltage selector)	AKR-027-0	

The following symbols st and for screws as shown in the exploded view.

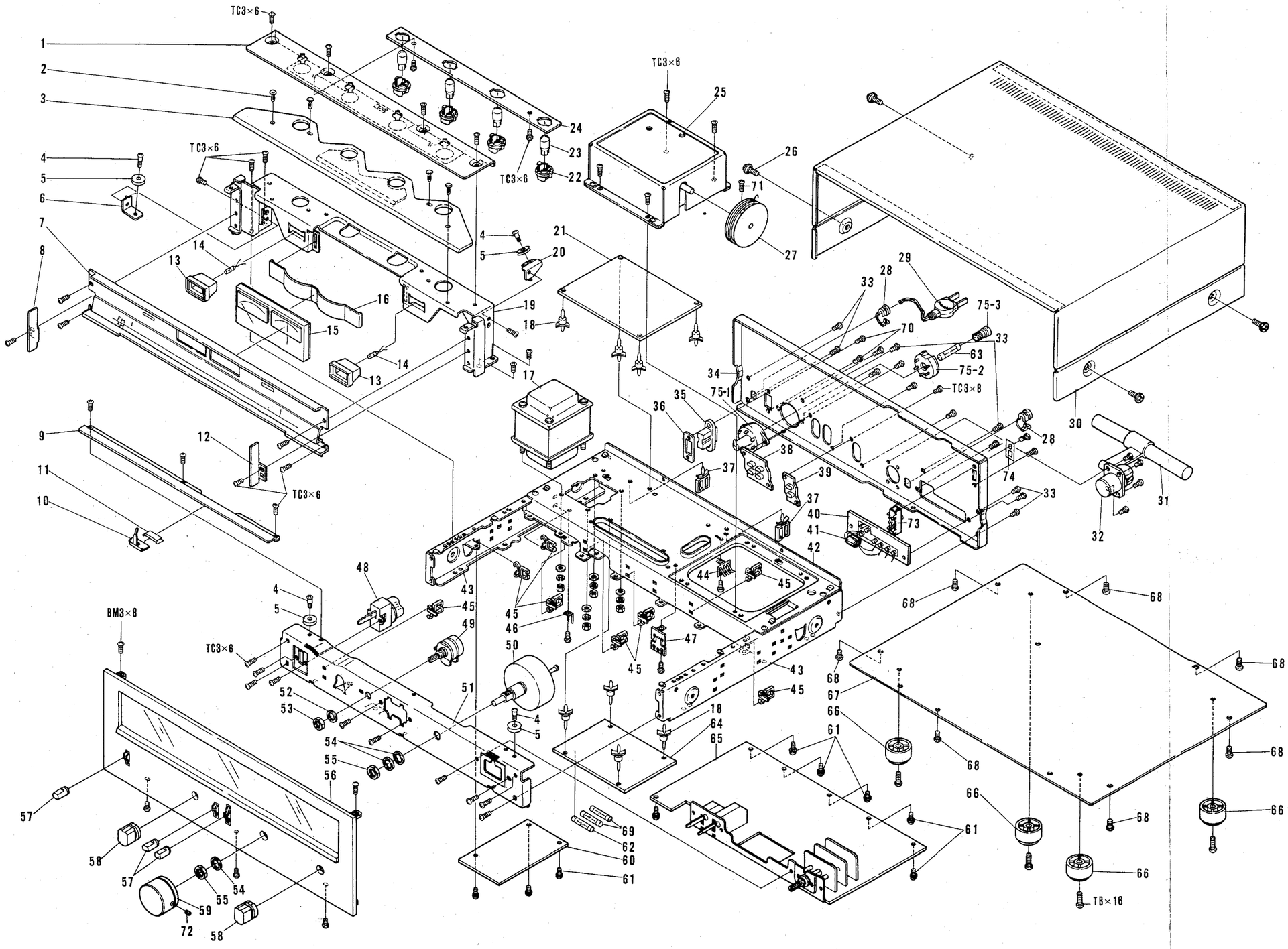
TC: Brazier head tapping screw

TB: Brazier head tapping screw (large pitch)

BM: Binding head screw

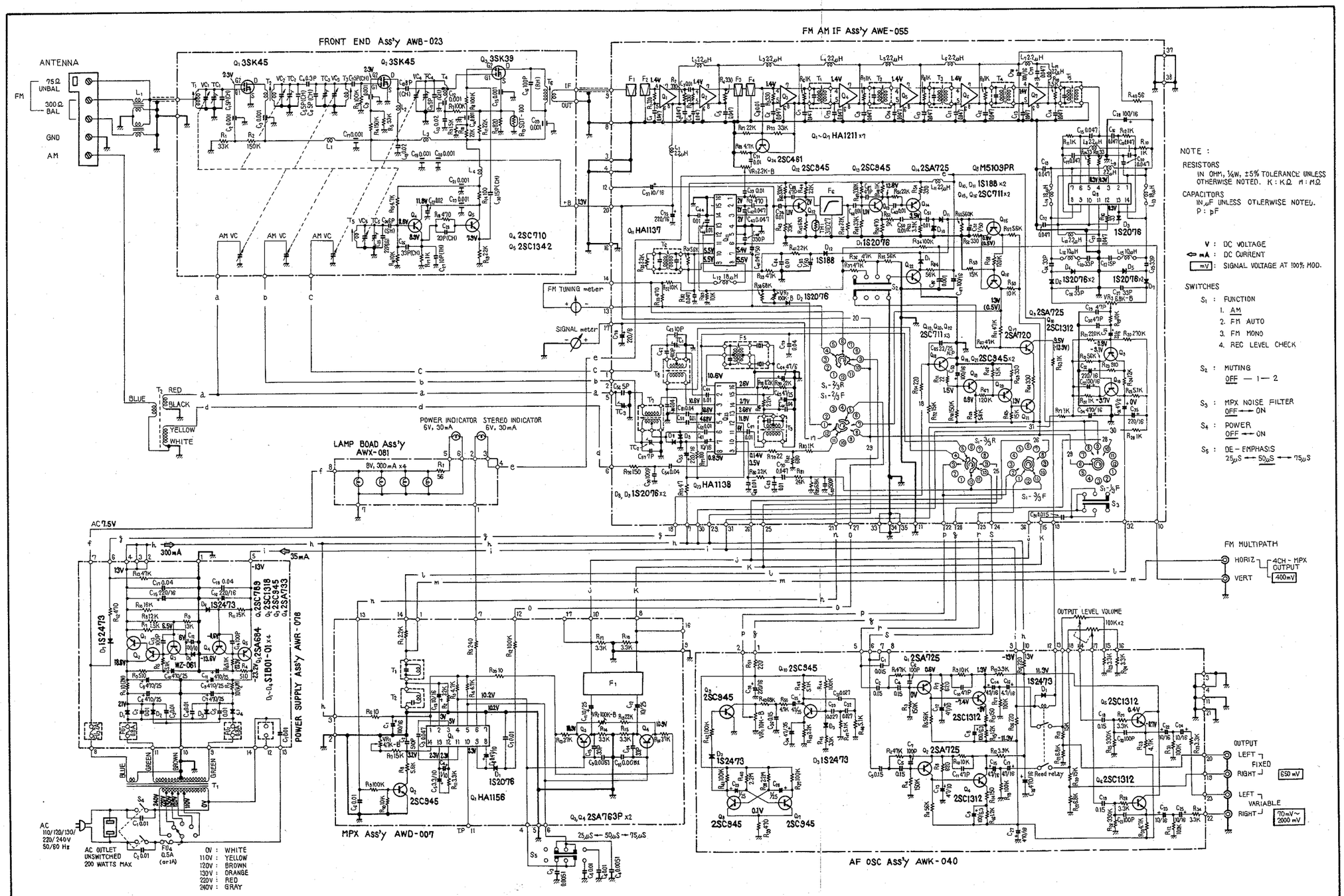


Exploded View

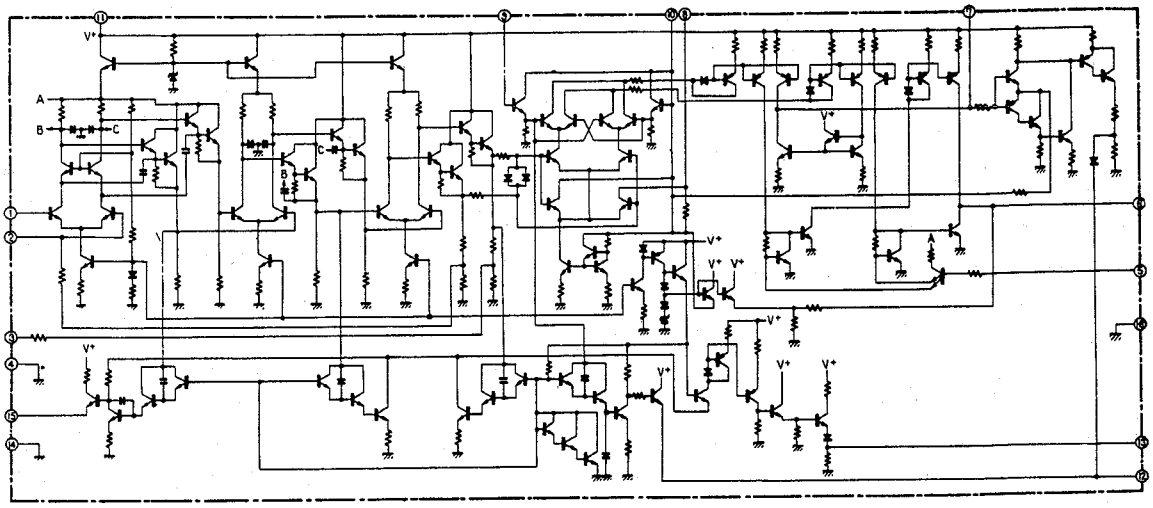


12. SCHEMATIC DIAGRAMS, PCB PATTERNS AND PARTS LISTS

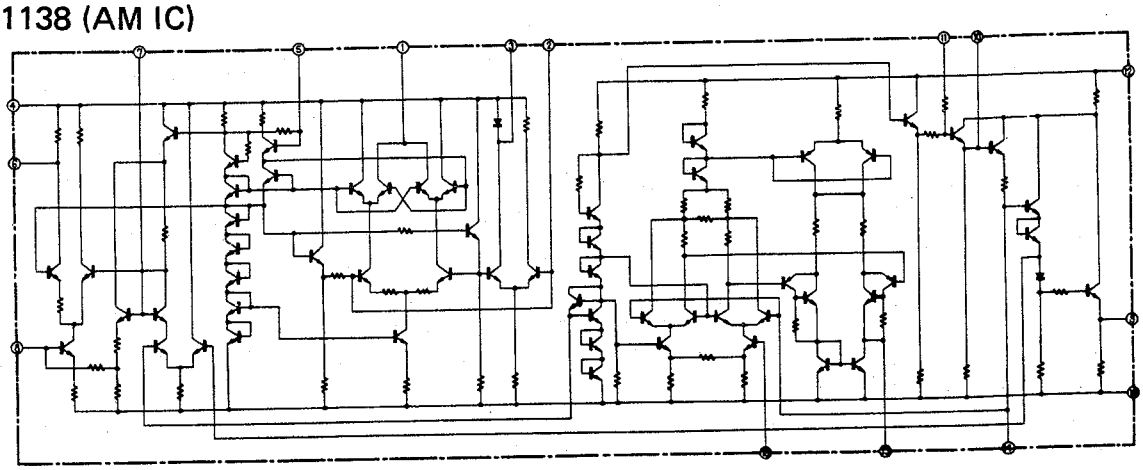
12.1 CIRCUIT DIAGRAM



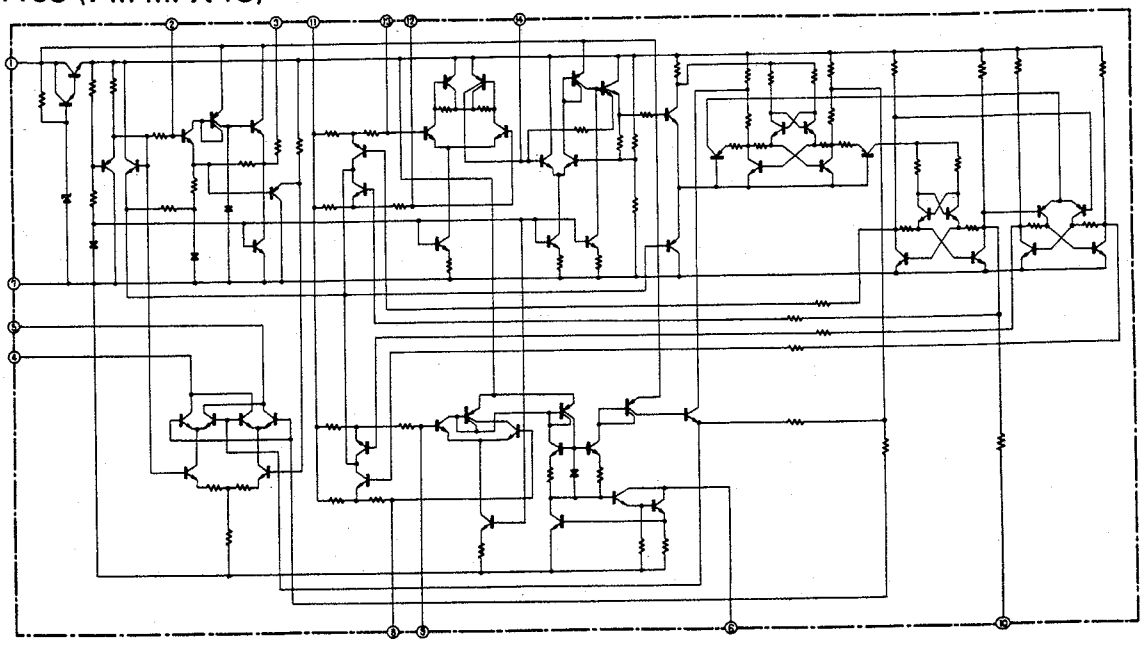
HA1137 (FM IF IC)



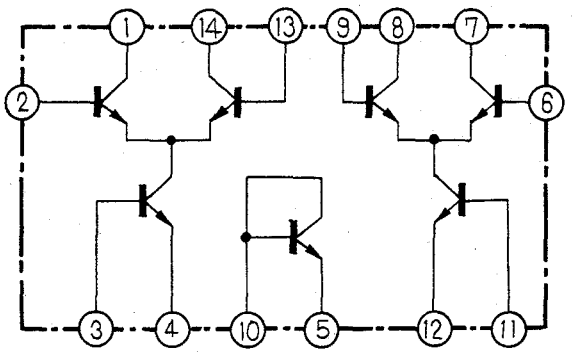
HA1138 (AM IC)



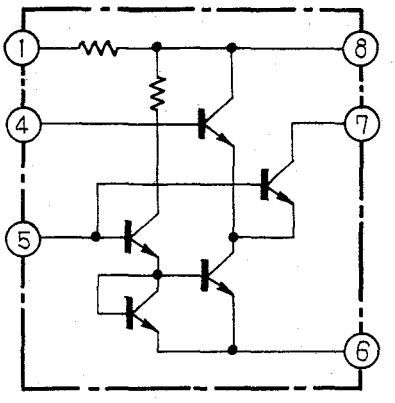
HA1156 (FM MPX IC)



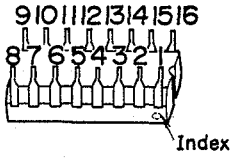
M5109P



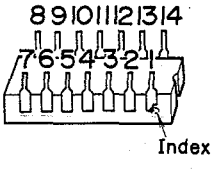
HA1211



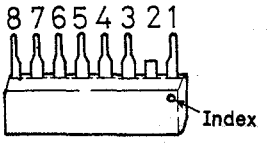
HA1138
HA1137



HA1156
M5109PR



HA1211

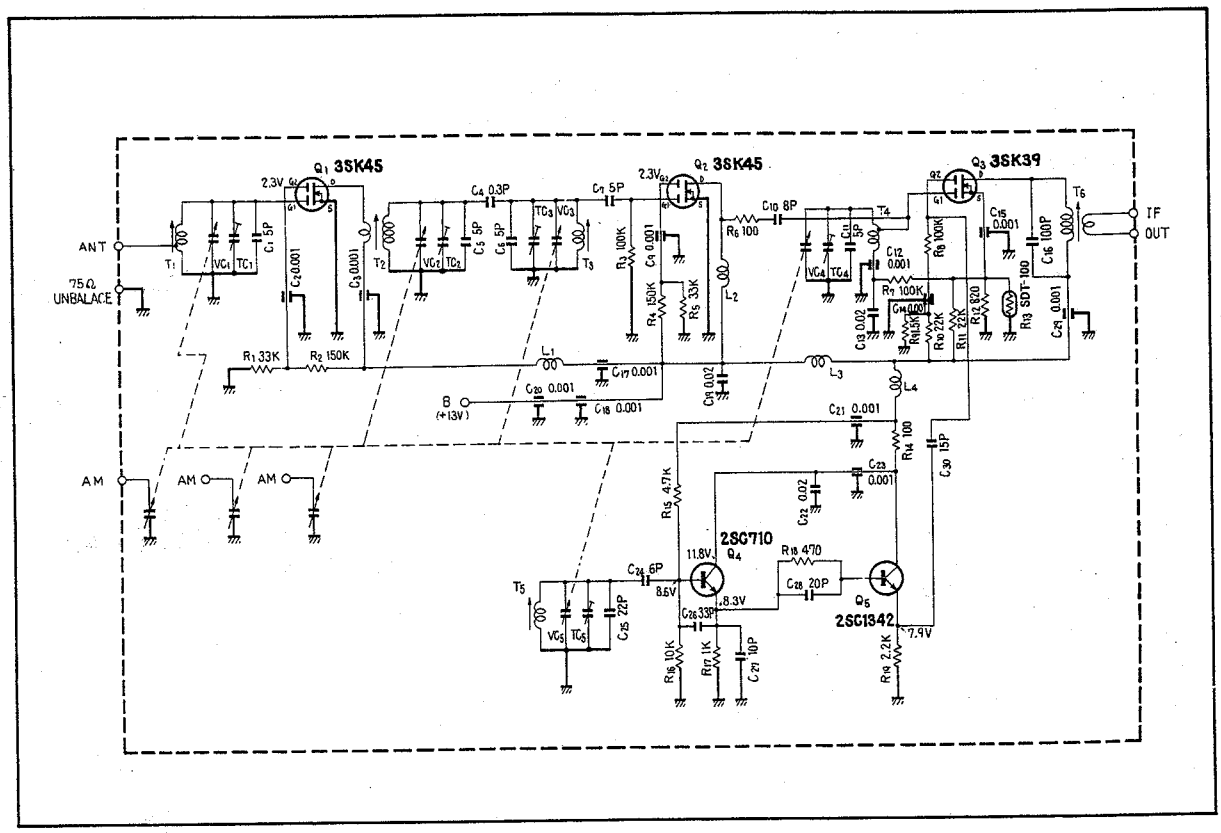


12.2 ELECTRO-PARTS

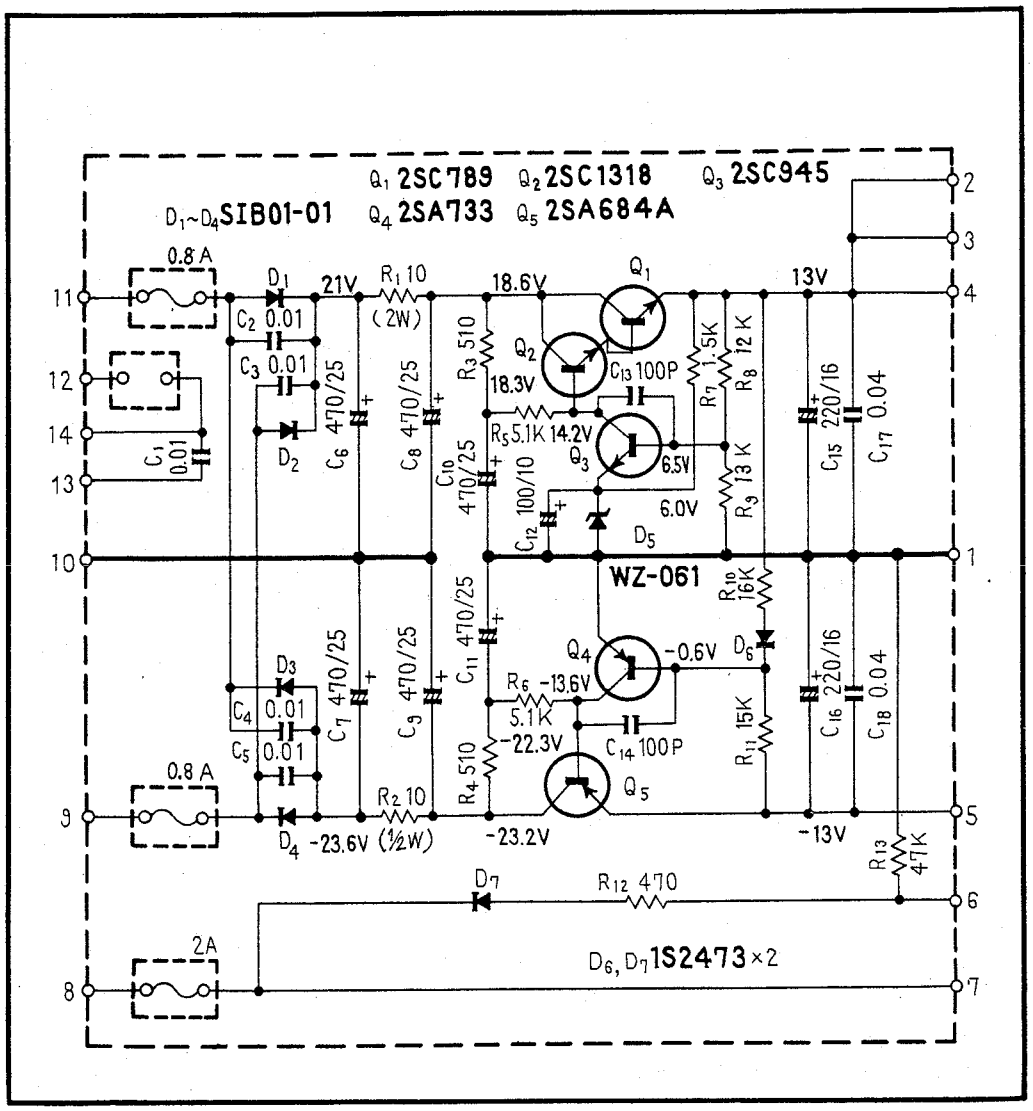
- CAPACITORS: IN μF UNLESS OTHERWISE NOTED p: pF
- RESISTORS: INΩ, ¼W UNLESS OTHERWISE NOTED k: kΩ, M: MΩ

Symbol	Description	Part No.	
C1	Ceramic capacitor 0.01 250V	ACG-001-0	
C2	Ceramic capacitor 0.01 250V	ACG-001-0	
C3	Mylar capacitor 0.0051 50V	CQMA 512J 50	
C4	Mylar capacitor 0.0051 50V	CQMA 512J 50	
C5	Mylar capacitor 0.01 50V	CQMA 103J 50	
C6	Mylar capacitor 0.01 50V	CQMA 103J 50	
FU1	Fuse 0.8A (secondary)	AEK-111-0	
FU2	Fuse 0.8A (secondary)	AEK-111-0	
FU3	Fuse 2A (lamps)	AEK-103-0	
FU4	Fuse 0.5A (primary)	AEK-107-0	110,120or130V
	Fuse 1A (primary)	AEK-106-0	220or240V
T1	Power transformer	ATT-235-A	
T2	Bar-antenna	ATB-040-0	
L1	Farrite balun	T22-025-A	
S4	Lever switch (POWER)	ASK-068-0	
S5	Slide switch (DE-EMPHASIS)	ASH-013-0	

12.3 FM FRONT END (AWB-023-0)

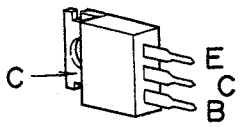


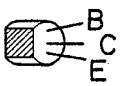
12.4 POWER SUPPLY CIRCUIT ASSEMBLY (AWR-076-0)



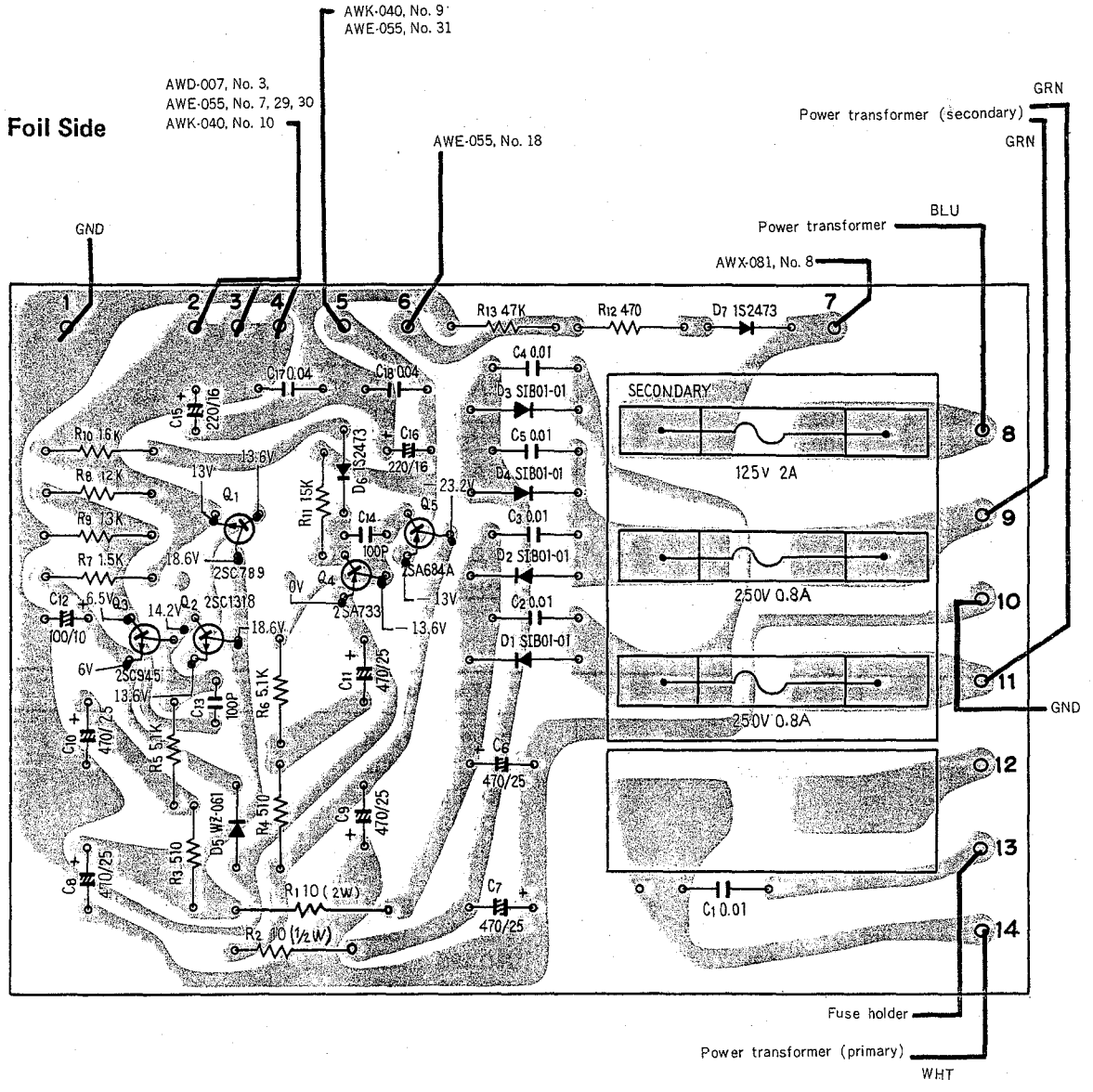
2SA733
2SC945
2SC1318

2SC789





2SA684A


Foil Side
AWK-040, No. 9
AWE-055, No. 31
AWD-007, No. 3,
AWE-055, No. 7, 29, 30
AWK-040, No. 10
AWE-055, No. 18
GRN
Power transformer (secondary)
GRN
BLU
Power transformer
AWX-081, No. 8
GND
SECONDARY
125V 2A
250V 0.8A
250V 0.8A
GND
Fuse holder
Power transformer (primary)
WHT
R13 47K
R12 470
D7 1S2473
C4 0.01
D3 SIB01-01
C5 0.01
D4 SIB01-01
C3 0.01
D2 SIB01-01
C2 0.01
D1 SIB01-01
C6 470/25
C7 470/25
C1 0.01
C17 0.04
C18 004
C15 220/16
C16 220/16
R10 1.6K
R8 12K
R9 13K
R7 1.5K
C12 100/10
C10 470/25
C8 470/25
R5 5.1K
R3 510
D5 WZ-061
R4 510
R6 5.1K
C13 100P
C11 470/25
C9 470/25
R1 10 (2W)
R2 10 (1/2W)
D6 1S2473
R11 15K
C14 100P
Q1 2SC789
Q2 2SC1318
Q3 2SC945
Q4 2SA733
Q5 2SA684A
13V
18.6V
14.2V
6.5V
6V
13.6V
0V
23.2V

Parts List of Power Supply Circuit Assembly (AWR-076-0)

CAPACITORS

Symbol	Description	Part No.	
C1	Ceramic 0.01 AC250V	ACG-001-0	
C2	Ceramic 0.01 AC150V	ACG-004-0	
C3	Ceramic 0.01 AC150V	ACG-004-0	
C4	Ceramic 0.01 AC150V	ACG-004-0	
C5	Ceramic 0.01 AC150V	ACG-004-0	
C6	Electrolytic 470 25V	CEA 471P 25	
C7	Electrolytic 470 25V	CEA 471P 25	
C8	Electrolytic 470 25V	CEA 471P 25	
C9	Electrolytic 470 25V	CEA 471P 25	
C10	Electrolytic 470 25V	CEA 471P 25	
C11	Electrolytic 470 25V	CEA 471P 25	
C12	Electrolytic 100 10V	CEA 101P 10	
C13	Ceramic 100p 50V	CCDSL 101K 50	
C14	Ceramic 100p 50V	CCDSL 101K 50	
C15	Electrolytic 220 16V	CEA 221P 16	
C16	Electrolytic 220 16V	CEA 221P 16	
C17	Ceramic 0.04 50V	CKDYF 403Z 50	
C18	Ceramic 0.04 50V	CKDYF 403Z 50	

RESISTORS

Symbol	Description	Part No.	
R1	Metal Oxide film 10 2W	RS2P 100K	
R2	Carbon film 10 ½W	RD½PSF 100J	
R3	Carbon film 510	RD¼PS 511J	
R4	Carbon film 510	RD¼PS 511J	
R5	Carbon film 5.1k	RD¼PS 512J	
R6	Carbon film 5.1k	RD¼PS 512J	
R7	Carbon film 1.5k	RD¼PS 152J	
R8	Carbon film 12k	RD¼PS 123J	
R9	Carbon film 13k	RD¼PS 133J	
R10	Carbon film 16k	RD¼PS 163J	
R11	Carbon film 15k	RD¼PS 153J	
R12	Carbon film 470	RD¼PS 471J	
R13	Carbon film 47k	RD¼PS 473J	

SEMICONDUCTORS

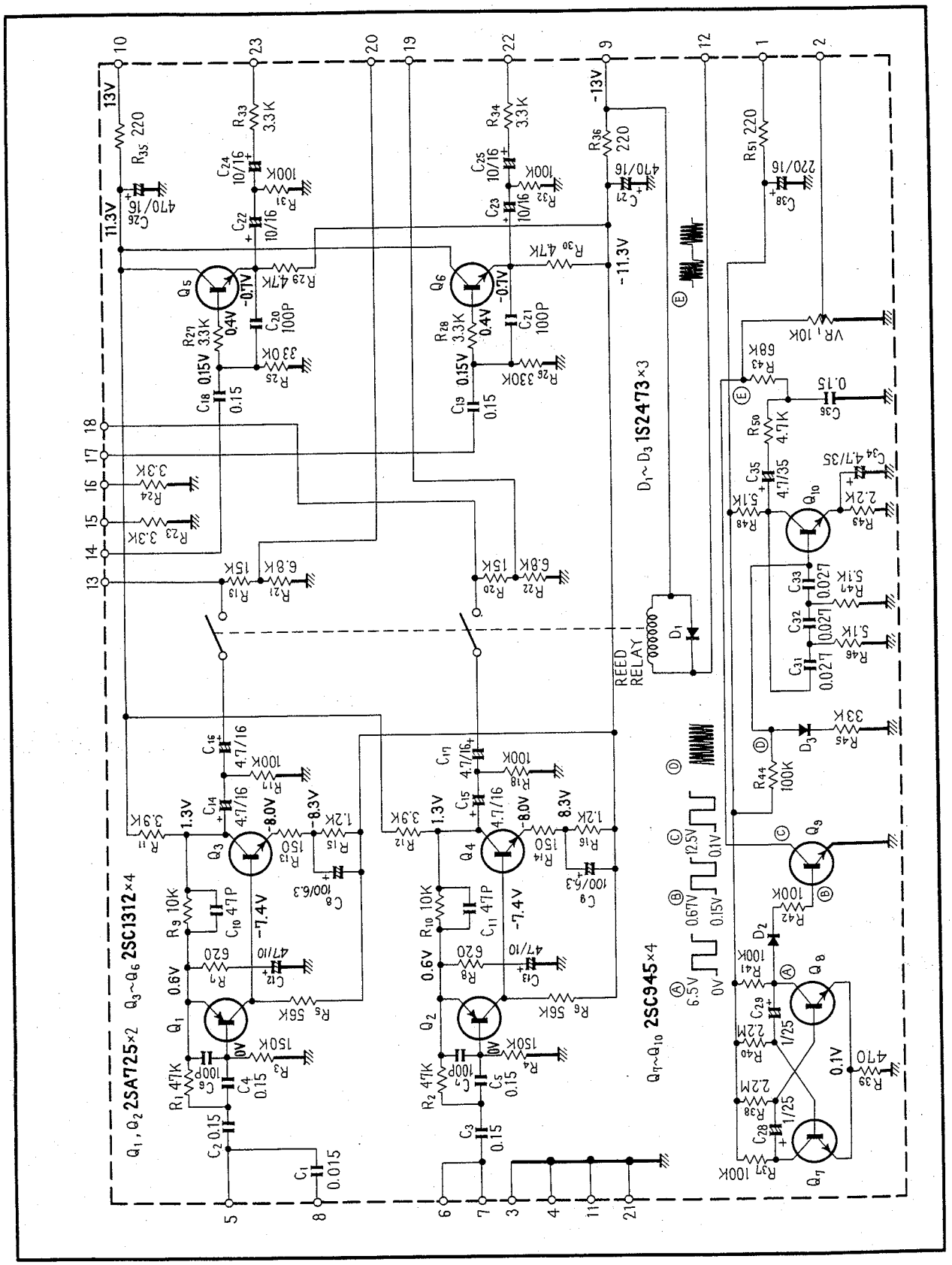
Symbol	Description	Part No.	
Q1	Transistor 2SC789-O or R (2SD313-D or E)		
Q2	Transistor 2SC1318-Q or R		
Q3	Transistor 2SC945-Q or R (2SC1647-P or Q)		
Q4	Transistor 2SA733-Q or R (2SA823-P or Q)		
Q5	Transistor 2SA684A-R or Q		
D1	Diode SIB01-01(1S1885)		
D2	Diode SIB01-01(1S1885)		

Symbol	Description	Part No.	
D3	Diode SIB01-01(1S1885)		
D4	Diode SIB01-01(1S1885)		
D5	Zener diode WZ-061		
D6	Diode 1S2473(1S1555)		
D7	Diode 1S2473(1S1555)		

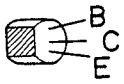
OTHERS

Symbol	Description	Part No.	
	Fuse clip	AKR-013-0	
	Heat sink	ANH-135-A	

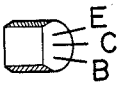
12.5 AF OSCILLATOR ASSEMBLY (AWK-040-0)



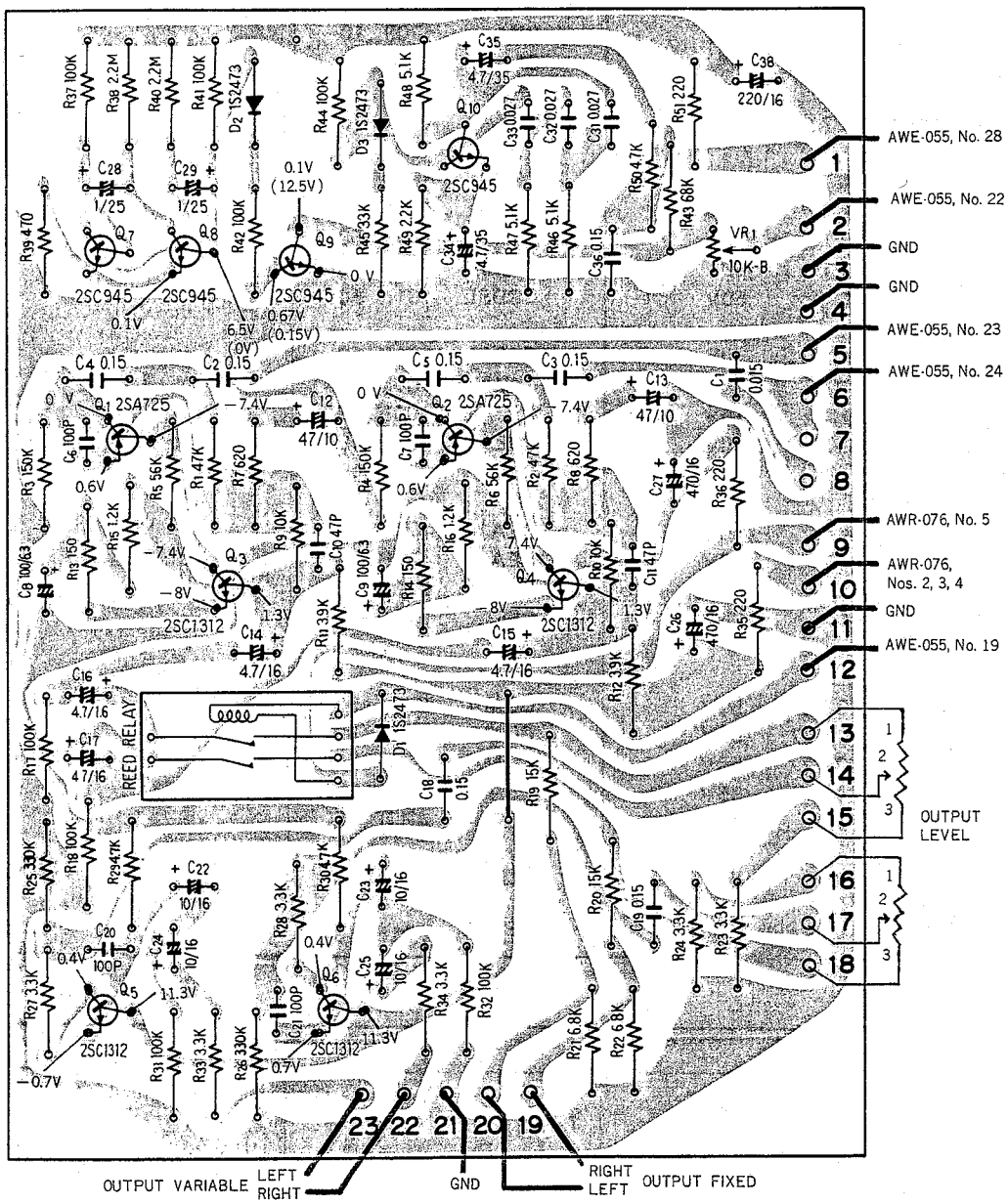
2SC945



2SA725
2SC1312



Foil Side



Parts List of Oscillator Assembly (AWK-040-0)

CAPACITORS

Symbol	Description			Part No.			
C1	Mylar	0.015	50V	CQMA	153J	50	
C2	Mylar	0.15	50V	CQMA	154J	50	
C3	Mylar	0.15	50V	CQMA	154J	50	
C4	Mylar	0.15	50V	CQMA	154J	50	
C5	Mylar	0.15	50V	CQMA	154J	50	
C6	Ceramic	100p	50V	CCDSL	101K	50	
C7	Ceramic	100p	50V	CCDSL	101P	50	
C8	Electrolytic	100	6V	CEA	101P	6	
C9	Electrolytic	100	6V	CEA	101P	6	
C10	Ceramic	47p	50V	CCDSL	470K	50	
C11	Ceramic	47p	50V	CCDSL	470K	50	
C12	Electrolytic	47	10V	CEA	470P	10	
C13	Electrolytic	47	10V	CEA	470P	10	
C14	Electrolytic	4.7	16V	CSZA	4R7M	16	
C15	Electrolytic	4.7	16V	CSZA	4R7M	16	
C16	Electrolytic	4.7	16V	CSZA	4R7M	16	
C17	Electrolytic	4.7	16V	CSZA	4R7M	16	
C18	Mylar	0.15	50V	CQMA	154J	50	
C19	Mylar	0.15	50V	CQMA	154J	50	
C20	Ceramic	100p	50V	CCDSL	101K	50	
C21	Ceramic	100p	50V	CCDSL	101K	50	
C22	Electrolytic	10	16V	CSZA	100M	16	
C23	Electrolytic	10	16V	CSZA	100M	16	
C24	Electrolytic	10	16V	CSZA	100M	16	
C25	Electrolytic	10	16V	CSZA	100M	16	
C26	Electrolytic	470	16V	CEA	471P	16	
C27	Electrolytic	470	16V	CEA	471P	16	
C28	Electrolytic	1	25V	CSSA	010M	25	
C29	Electrolytic	1	25V	CSSA	010M	25	
C30	.....						
C31	Mylar	0.027	50V	CQMA	273J	50	
C32	Mylar	0.027	50V	CQMA	273J	50	
C33	Mylar	0.027	50V	CQMA	273J	50	
C34	Electrolytic	4.7	35V	CEA	4R7P	35	
C35	Electrolytic	4.7	35V	CEA	4R7P	35	
C36	Mylar	0.15	50V	CQMA	154J	50	
C37	.....						
C38	Electrolytic	220	16V	CEA	221P	16	

RESISTORS

Symbol	Description		Part No.		
R1	Carbon film	47k	RD¼PS	473J	
R2	Carbon film	47k	RD¼PS	473J	
R3	Carbon film	150k	RD¼PS	154J	
R4	Carbon film	150k	RD¼PS	154J	
R5	Carbon film	56k	RD¼PS	563J	
R6	Carbon film	56k	RD¼PS	563J	

Symbol	Description		Part No.	
R7	Carbon film	620	RD¼PS 621J	
R8	Carbon film	620	RD¼PS 621J	
R9	Carbon film	10k	RD¼PS 103J	
R10	Carbon film	10k	RD¼PS 103J	
R11	Carbon film	3.9k	RD¼PS 392J	
R12	Carbon film	3.9k	RD¼PS 392J	
R13	Carbon film	150	RD¼PS 151J	
R14	Carbon film	150	RD¼PS 151J	
R15	Carbon film	1.2k	RD¼PS 122J	
R16	Carbon film	1.2k	RD¼PS 122J	
R17	Carbon film	100k	RD¼PS 104J	
R18	Carbon film	100k	RD¼PS 104J	
R19	Carbon film	15k	RD¼PS 153J	
R20	Carbon film	15k	RD¼PS 153J	
R21	Carbon film	6.8k	RD¼PS 682J	
R22	Carbon film	6.8k	RD¼PS 682J	
R23	Carbon film	3.3k	RD¼PS 332J	
R24	Carbon film	3.3k	RD¼PS 332J	
R25	Carbon film	330k	RD¼PS 334J	
R26	Carbon film	330k	RD¼PS 334J	
R27	Carbon film	3.3k	RD¼PS 332J	
R28	Carbon film	3.3k	RD¼PS 332J	
R29	Carbon film	4.7k	RD¼PS 472J	
R30	Carbon film	4.7k	RD¼PS 472J	
R31	Carbon film	100k	RD¼PS 104J	
R32	Carbon film	100k	RD¼PS 104J	
R33	Carbon film	3.3k	RD¼PS 332J	
R34	Carbon film	3.3k	RD¼PS 332J	
R35	Carbon film	220	RD¼PS 221J	
R36	Carbon film	220	RD¼PS 221J	
R37	Carbon film	100k	RD¼PS 104J	
R38	Carbon film	2.2M	RD¼PS 225J	
R39	Carbon film	470	RD¼PS 471J	
R40	Carbon film	2.2M	RD¼PS 225J	
R41	Carbon film	100k	RD¼PS 104J	
R42	Carbon film	100k	RD¼PS 104J	
R43	Carbon film	68k	RD¼PS 683J	
R44	Carbon film	100k	RD¼PS 104J	
R45	Carbon film	33k	RD¼PS 333J	
R46	Carbon film	5.1k	RD¼PS 512J	
R47	Carbon film	5.1k	RD¼PS 512J	
R48	Carbon film	5.1k	RD¼PS 512J	
R49	Carbon film	2.2k	RD¼PS 222J	
R50	Carbon film	4.7k	RD¼PS 472J	
R51	Carbon film	220	RD¼PS 221J	
VR1	Semi-fixed	10k-B	C92-049-0	

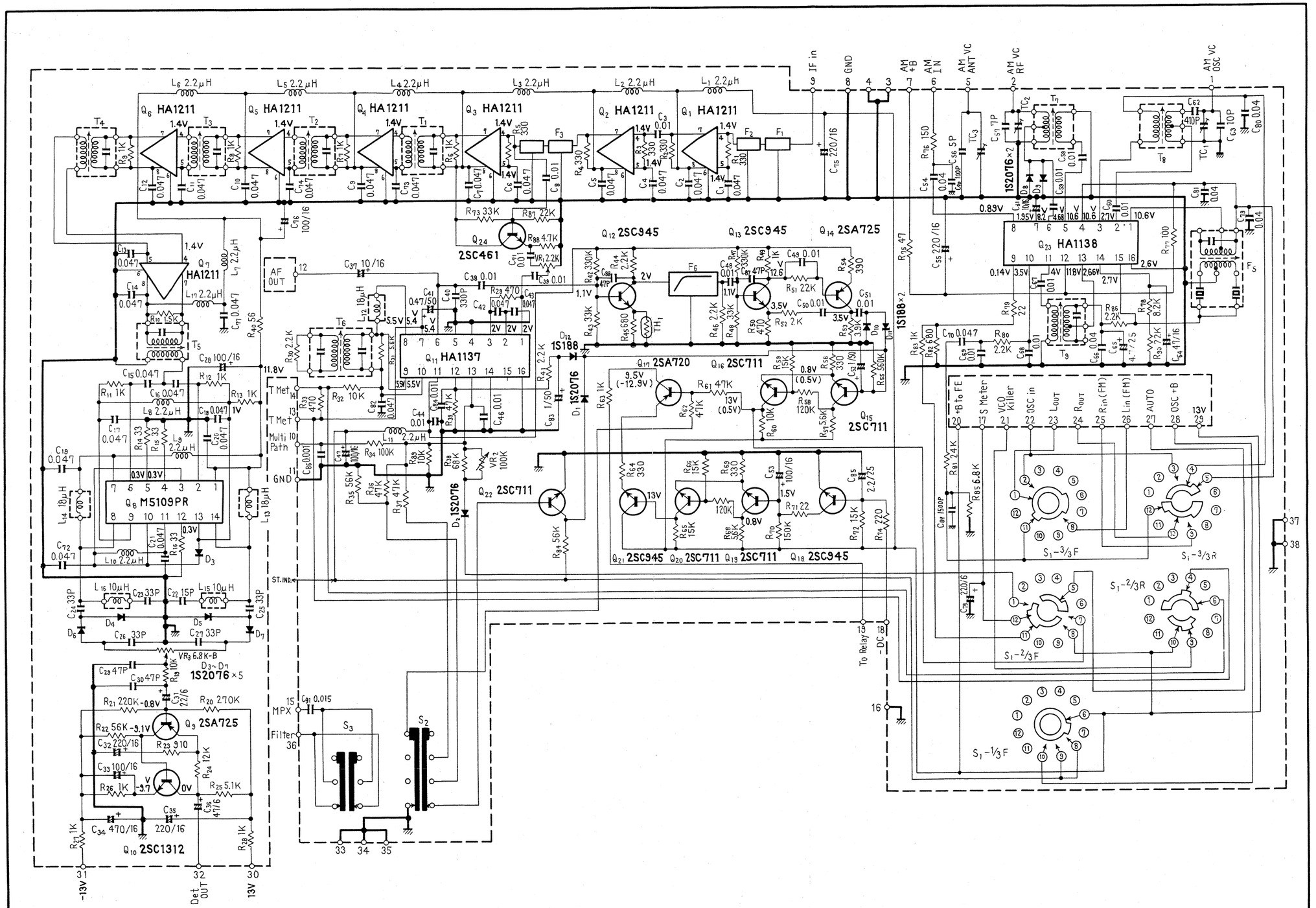
SEMICONDUCTORS

Symbol	Description		Part No.	
Q1	Transistor	2SA725-F or G (2SA763P-5 or 6)		
Q2	Transistor	2SA725-F or G (2SA763P-5 or 6)		
Q3	Transistor	2SC1312-G, F or H (2SC1344-D, E or F)		
Q4	Transistor	2SC1312-G, F or H (2SC1344-D, E or F)		
Q5	Transistor	2SC1312-G, F or H (2SC1344-D, E or F)		
Q6	Transistor	2SC1312-G, F or H (2SC1344-D, E or F)		
Q7	Transistor	2SC945-Q or R		
Q8	Transistor	2SC945-Q or R		
Q9	Transistor	2SC945-Q or R		
Q10	Transistor	2SC945-Q or P		
D1	Diode	1S2473 (1S1555)		
D2	Diode	1S2473 (1S1555)		
D3	Diode	1S2473 (1S1555)		

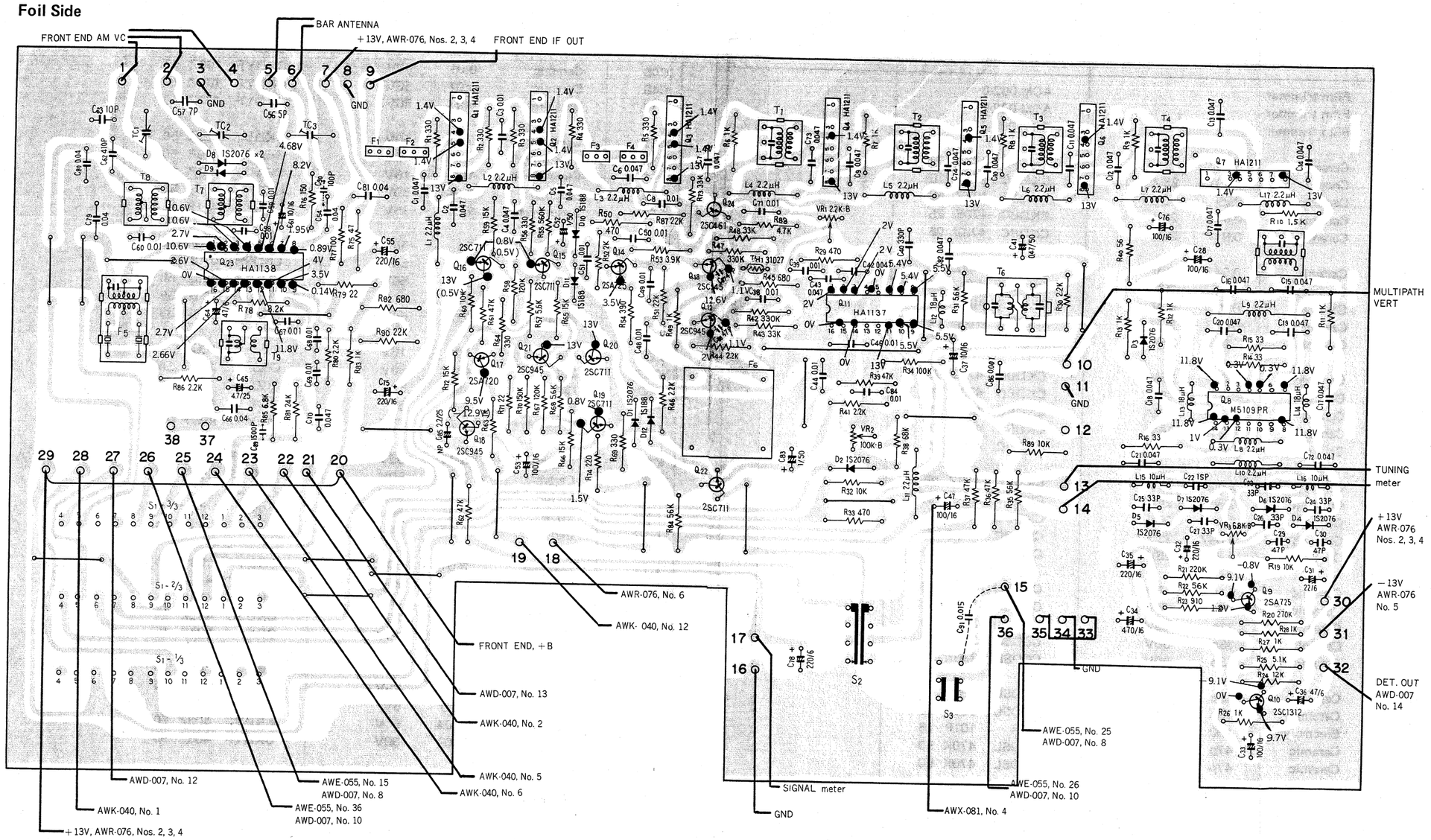
OTHER

Symbol	Description	Part No.	
S1	Reed relay	ASR-005-C	

12.6 AM-FM IF ASSEMBLY (AWE-055-A)



Foil Side



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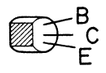

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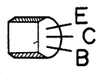

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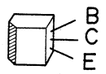

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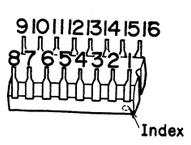
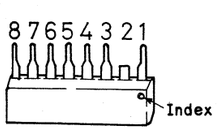
HA1138

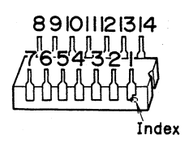


AWE-055

M5109PR

HA1211





AWE-055

Parts List of AM-FM IF Assembly (AWE-055-A)

CAPACITORS

Symbol	Description	Part No.	
TC1	Film trimmer	ACM-002-0	
TC2	Film trimmer	ACM-002-0	
TC3	Film trimmer	ACM-002-0	
C1	Ceramic 0.047 25V	CKDBC 473Z 25	
C2	Ceramic 0.047 25V	CKDBC 473Z 25	
C3	Ceramic 0.01 50V	CKDYF 103Z 50	
C4	Ceramic 0.047 25V	CKDBC 473Z 25	
C5	Ceramic 0.047 25V	CKDBC 473Z 25	
C6	Ceramic 0.047 25V	CKDBC 473Z 25	
C7	Ceramic 0.047 25V	CKDBC 473Z 25	
C8	Ceramic 0.01 50V	CKDYF 103Z 50	
C9	Ceramic 0.047 25V	CKDBC 473Z 25	
C10	Ceramic 0.047 25V	CKDBC 473Z 25	
C11	Ceramic 0.047 25V	CKDBC 473Z 25	
C12	Ceramic 0.047 25V	CKDBC 473Z 25	
C13	Ceramic 0.047 25V	CKDBC 473Z 25	
C14	Ceramic 0.047 25V	CKDBC 473Z 25	
C15	Ceramic 0.047 25V	CKDBC 473Z 25	
C16	Ceramic 0.047 25V	CKDBC 473Z 25	
C17	Ceramic 0.047 25V	CKDBC 473Z 25	
C18	Ceramic 0.047 25V	CKDBC 473Z 25	
C19	Ceramic 0.047 25V	CKDBC 473Z 25	
C20	Ceramic 0.047 25V	CKDBC 473Z 25	
C21	Ceramic 0.047 25V	CKDBC 473Z 25	
C22	Ceramic 15p 50V	CCDCH 150J 50	
C23	Ceramic 33p 50V	CCDCH 330J 50	
C24	Ceramic 33p 50V	CCDSL 330K 50	
C25	Ceramic 33p 50V	CCDSL 330K 50	
C26	Ceramic 33p 50V	CCDSL 330K 50	
C27	Ceramic 33p 50V	CCDSL 330K 50	
C28	Electrolytic 100 16V	CEA 101P 16	
C29	Ceramic 47p 50V	CCDSL 470K 50	
C30	Ceramic 47p 50V	CCOSL 470K 50	
C31	Electrolytic 22 6V	CSZA 220M 6	
C32	Electrolytic 220 16V	CEA 221P 16	
C33	Electrolytic 100 16V	CEA 101P 16	
C34	Electrolytic 470 16V	CEA 471P 16	
C35	Electrolytic 220 16V	CEA 221P 16	
C36	Electrolytic 47 6V	CSZA 470M 6	
C37	Electrolytic 10 16V	CEA 100P 16	
C38	Ceramic 0.01 50V	CKDYF 103Z 50	
C39	Ceramic 0.01 50V	CKDYF 103Z 50	
C40	Ceramic 330p 50V	CKDYB 331K 50	
C41	Electrolytic 0.47 50V	CEA R47P 50	
C42	Ceramic 0.047 25V	CKDBC 473Z 25	
C43	Ceramic 0.047 25V	CKDBC 473Z 25	
C44	Ceramic 0.01 50V	CKDYF 103Z 50	
C45	.....		

Symbol	Description	Part No.	
C46	Ceramic 0.01 50V	CKDYF 103Z 50	
C47	Electrolytic 100 16V	CEA 101P 16	
C48	Ceramic 0.01 50V	CKDYF 103Z 50	
C49	Ceramic 0.01 50V	CKDYF 103Z 50	
C50	Ceramic 0.01 50V	CKDYF 103Z 50	
C51	Ceramic 0.01 50V	CKDYF 103Z 50	
C52	Electrolytic 1 50V	CEA 010P 50	
C53	Electrolytic 100 16V	CEA 101P 16	
C54	Ceramic 0.04 50V	CKDYF 403Z 50	
C55	Electrolytic 220 16V	CEA 221P 16	
C56	Ceramic 5p 50V	CCDSH 050D 50	
C57	Ceramic 7p 50V	CCDSH 070F 50	
C58	Ceramic 0.01 50V	CKDYF 103Z 50	
C59	Ceramic 0.01 50V	CKDYF 103Z 50	
C60	Mylar 0.01 50V	CQMA 103K 50	
C61	Electrolytic 10 16V	CEA 100P 16	
C62	Styrol 410p 50V	CQSA 411J 50	
C63	Ceramic 10p 50V	CCDWK 100F 50	
C64	Electrolytic 47 6V	CEA 470P 6	
C65	Electrolytic 4.7 25V	CEA 4R7P 25	
C66	Ceramic 0.04 50V	CKDYF 403Z 50	
C67	Ceramic 0.01 50V	CKDYF 103Z 50	
C68	Mylar 0.01 50V	CQMA 103K 50	
C69	Mylar 0.01 50V	CQMA 103K 50	
C70	Mylar 0.047 50V	CQMA 473K 50	
C71	Ceramic 0.01 50V	CKDYF 103Z 50	
C72	Ceramic 0.047 25V	CKDBC 473Z 25	
C73	Ceramic 0.047 25V	CKDBC 473Z 25	
C74	Ceramic 0.047 25V	CKDBC 473Z 25	
C75	Electrolytic 220 16V	CEA 221P 16	
C76	Electrolytic 100 16V	CEA 101P 16	
C77	Ceramic 0.047 25V	CKDBC 473Z 25	
C78	Electrolytic 220 6V	CEA 221P 6	
C79	Ceramic 0.04 50V	CKDYF 403Z 50	
C80	Ceramic 0.04 50V	CKDYF 403Z 50	
C81	Ceramic 0.04 50V	CKDYF 403Z 50	
C82	Ceramic 0.047 25V	CKDBC 473Z 25	
C83	Electrolytic 1 50V	CEA 010P 50	
C84	Ceramic 0.01 50V	CKDYF 103Z 50	
C85	Electrolytic 2.2 25V	CEA 2R2M 25NP	
C86	Ceramic 0.001 50V	CKDYF 102Z 50	
C87	Ceramic 47p 50V	CCDSL 470K 50	
C88	Ceramic 47p 50V	CCDSL 470K 50	
C89	Ceramic 1500p 50V	CKDYB 152K 50	
C90	Ceramic 100p 50V	CCDSL 101K 50	
C91	Mylar 0.015 50V	CQMA 153J 50	

RESISTORS

Symbol	Description	Part No.	
R1	Carbon film 330	RD¼PS 331J	
R2	Carbon film 330	RD¼PS 331J	
R3	Carbon film 330	RD¼PS 331J	
R4	Carbon film 330	RD¼PS 331J	
R5	Carbon film 330	RD¼PS 331J	
R6	Carbon film 1k	RD¼PS 102J	
R7	Carbon film 1k	RD¼PS 102J	
R8	Carbon film 1k	RD¼PS 102J	
R9	Carbon film 1k	RD¼PS 102J	
R10	Carbon film 1.5k	RD¼PS 152J	
R11	Carbon film 1k	RD¼PS 102J	
R12	Carbon film 1k	RD¼PS 102J	
R13	Carbon film 1k	RD¼PS 102J	
R14	Carbon film 33	RD¼PS 330J	
R15	Carbon film 33	RD¼PS 330J	
R16	Carbon film 33	RD¼PS 330J	
R17	.....		
R18	.....		
R19	Carbon film 10k	RD¼PS 103J	
R20	Carbon film 270k	RD¼PS 274J	
R21	Carbon film 220k	RD¼PS 224J	
R22	Carbon film 56k	RD¼PS 563J	
R23	Carbon film 910	RD¼PS 911J	
R24	Carbon film 12k	RD¼PS 123J	
R25	Carbon film 5.1k	RD¼PS 512J	
R26	Carbon film 1k	RD¼PS 102J	
R27	Carbon film 1k	RD¼PS 102J	
R28	Carbon film 1k	RD¼PS 102J	
R29	Carbon film 470	RD¼PS 471J	
R30	Carbon film 2.2k	RD¼PS 222J	
R31	Carbon film 5.6k	RD¼PS 562J	
R32	Carbon film 10k	RD¼PS 103J	
R33	Carbon film 470	RD¼PS 471J	
R34	Carbon film 100k	RD¼PS 104J	
R35	Carbon film 56k	RD¼PS 563J	
R36	Carbon film 47k	RD¼PS 473J	
R37	Carbon film 47k	RD¼PS 473J	
R38	Carbon film 68k	RD¼PS 683J	
R39	Carbon film 47k	RD¼PS 473J	
R40	Carbon film 56	RD¼PS 560J	
R41	Carbon film 2.2k	RD¼PS 222J	
R42	Carbon film 330k	RD¼PS 334J	
R43	Carbon film 33k	RD¼PS 333J	
R44	Carbon film 2.2k	RD¼PS 222J	
R45	Carbon film 680	RD¼PS 681J	
R46	Carbon film 2.2k	RD¼PS 222J	
R47	Carbon film 330k	RD¼PS 334J	
R48	Carbon film 33k	RD¼PS 333J	
R49	Carbon film 1k	RD¼PS 102J	
R50	Carbon film 470	RD¼PS 471J	

Continued on the Next Page

Symbol	Description		Part No.	
R51	Carbon film	22k	RD¼PS 223J	
R52	Carbon film	2k	RD¼PS 202J	
R53	Carbon film	3.9k	RD¼PS 392J	
R54	Carbon film	390	RD¼PS 391J	
R55	Carbon film	560k	RD¼PS 564J	
R56	Carbon film	330	RD¼PS 331J	
R57	Carbon film	5.6k	RD¼PS 562J	
R58	Carbon film	120k	RD¼PS 124J	
R59	Carbon film	15k	RD¼PS 153J	
R60	Carbon film	10k	RD¼PS 103J	
R61	Carbon film	47k	RD¼PS 473J	
R62	Carbon film	47k	RD¼PS 473J	
R63	Carbon film	1k	RD¼PS 102J	
R64	Carbon film	330	RD¼PS 331J	
R65	Carbon film	15k	RD¼PS 153J	
R66	Carbon film	15k	RD¼PS 153J	
R67	Carbon film	120k	RD¼PS 124J	
R68	Carbon film	56k	RD¼PS 562J	
R69	Carbon film	330	RD¼PS 331J	
R70	Carbon film	150k	RD¼PS 154J	
R71	Carbon film	22	RD¼PS 220J	
R72	Carbon film	15k	RD¼PS 153J	
R73	Carbon film	33k	RD¼PS 333J	
R74	Carbon film	220	RD¼PS 221J	
R75	Carbon film	47	RD¼PS 470J	
R76	Carbon film	150	RD¼PS 151J	
R77	Carbon film	100	RD¼PS 101J	
R78	Carbon film	8.2k	RD¼PS 822J	
R79	Carbon film	22	RD¼PS 220J	
R80	Carbon film	2.2k	RD¼PS 222J	
R81	Carbon film	24k	RD¼PS 243J	
R82	Carbon film	680	RD¼PS 681J	
R83	Carbon film	1k	RD¼PS 102J	
R84	Carbon film	56k	RD¼PS 563J	
R85	Carbon film	6.8k	RD¼PS 682J	
R86	Carbon film	2.2k	RD¼PS 222J	
R87	Carbon film	22k	RD¼PS 223J	
R88	Carbon film	4.7k	RD¼PS 472J	
R89	Carbon film	10k	RD¼PS 103J	
R90	Carbon film	22k	RD¼PS 223J	
VR1	Semi-fixed	2.2k-B	ACP-001-0	
VR2	Semi-fixed	100k-B	C92-047-0	
VR3	Semi-fixed	6.8k-B	ACP-023-0	

SEMICONDUCTORS

Symbol	Description		Part No.	
Q1	IC	HA 1211		
Q2	IC	HA 1211		
Q3	IC	HA 1211		
Q4	IC	HA 1211		
Q5	IC	HA 1211		
Q6	IC	HA 1211		
Q7	IC	HA 1211		
Q8	IC	M5109PR		
Q9	Transistor	2SA725-G, F or H (2SA763P-5 or 6)		
Q10	Transistor	2SC1312-G, F or H		
Q11	IC	HA 1137		
Q12	Transistor	2SC945-Q or R		
Q13	Transistor	2SC945-Q or R		
Q14	Transistor	2SA725-G, F or H (2SA763P-5 or 6)		
Q15	Transistor	2SC711-F or G (2SC945-Q or R)		
Q16	Transistor	2SC711-F or G (2SC945-Q or R)		
Q17	Transistor	2SA720-R or S		
Q18	Transistor	2SC945-Q or R		
Q19	Transistor	2SC711-F or G (2SC945-Q or R)		
Q20	Transistor	2SC711-F or G (2SC945-Q or R)		
Q21	Transistor	2SC945-Q or R		
Q22	Transistor	2SC711-F or G (2SC945-Q or R)		
Q23	IC	HA 1138		
Q24	Transistor	2SC461-B, A or C		
D1	Diode	1S2076		
D2	Diode	1S2076		
D3	Diode	1S2076		
D4	Diode	1S2076		
D5	Diode	1S2076		
D6	Diode	1S2076		
D7	Diode	1S2076		
D8	Diode	1S2076		
D9	Diode	1S2076		
D10	Diode	1S188FM-1		
D11	Diode	1S188FM-1		
D12	Diode	1S188FM-1		
TH1	Thermistor	31D27		

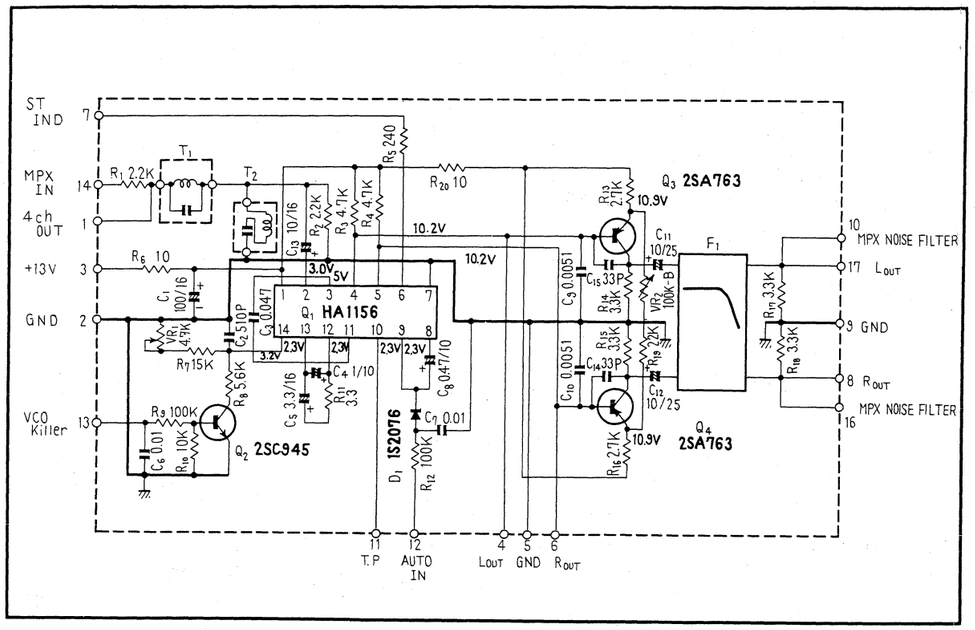
COILS, TRANSFORMERS

Symbol	Description	Part No.	
T1	FM matching transformer	ATE-008-0	
T2	FM IF transformer	ATE-023-0	
T3	FM IF transformer	ATE-023-0	
T4	FM IF transformer	ATE-023-0	
T5	FM IF transformer	ATE-023-0	
T6	FM IF transformer	T73-035-A	
T7	AM RF coil	ATB-020-C	
T8	AM OSC coil	ATB-019-0	
T9	AM IF transformer	ATE-012-0	
L1	RF choke coil 2.2μH	T24-028-A	
L2	RF choke coil 2.2μH	T24-028-A	
L3	RF choke coil 2.2μH	T24-028-A	
L4	RF choke coil 2.2μH	T24-028-A	
L5	RF choke coil 2.2μH	T24-028-A	
L6	RF choke coil 2.2μH	T24-028-A	
L7	RF choke coil 2.2μH	T24-028-A	
L8	RF choke coil 2.2μH	T24-028-A	
L9	RF choke coil 2.2μH	T24-028-A	
L10	RF choke coil 2.2μH	T24-028-A	
L11	RF choke coil 2.2μH	T24-028-A	
L12	RF choke coil 18μH	ATH-007-0	
L13	RF choke coil 18μH	ATH-007-0	
L14	RF choke coil 18μH	ATH-007-0	
L15	RF choke coil 10μH	ATH-010-B	
L16	RF choke coil 10μH	ATH-010-B	
L17	RF choke coil 2.2μH	T24-028-0	
F1	FM ceramic filter	ATF-018-0	
F2	FM ceramic filter	ATF-018-0	
F3	FM ceramic filter	ATF-018-0	
F4	FM ceramic filter	ATF-018-0	
F5	AM ceramic filter	ATF-009-0	
F6	High pass filter	ATF-014-0	

OTHERS

Symbol	Description	Part No.	
S1	Rotary switch (FUNCTION)	ASD-037-A	
S2	Lever switch (MPX NOISE FILTER)	ASK-087-B	
S3	Lever switch (FM MUTING)	ASK-090-A	
	Washer (9ϕ)	B22-016-0	
	Nut (9ϕ)	B71-004-0	

12.7 MPX ASSEMBLY (AWD-007-0)



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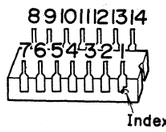

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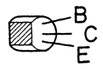
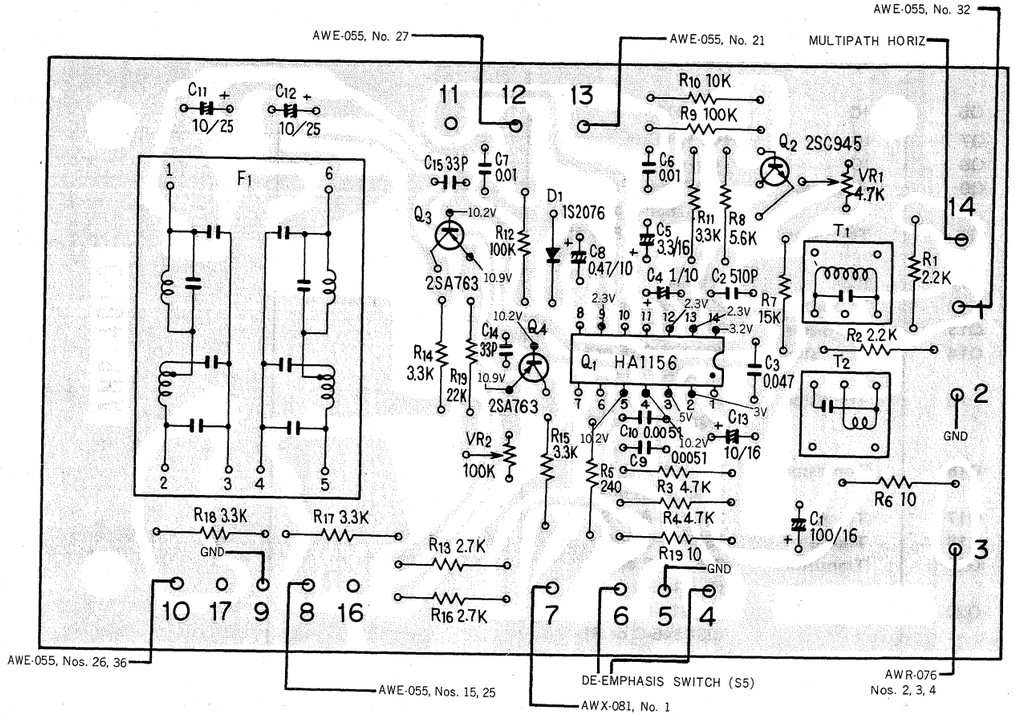


Parts List of MPX Assembly (AWD-007-0)

CAPACITORS

Symbol	Description			Part No.		
C1	Electrolytic	100	16V	CEA	101P	16
C2	Styrol	510p	50V	CQSH	511J	50
C3	Mylar	0.047	50V	CQMA	473K	50
C4	Electrolytic	1	10V	CSSA	010M	10
C5	Electrolytic	3.3	10V	CSSA	3R3M	10
C6	Ceramic	0.01	50V	CKDYF	103Z	50
C7	Ceramic	0.01	50V	CKDYF	103Z	50
C8	Electrolytic	0.47	10V	CSSA	R47M	10
C9	Mylar	0.0051	50V	CQMA	512J	50
C10	Mylar	0.0051	50V	CQMA	512J	50
C11	Electrolytic	10	25V	CEANL	100P	25
C12	Electrolytic	10	25V	CEANL	100P	25
C13	Electrolytic	10	16V	CEA	100P	16
C14	Ceramic	33p	50V	CCDSL	330K	50
C15	Ceramic	33p	50V	CCDSL	330K	50



RESISTORS

Symbol	Description		Part No.	
R1	Carbon film	2.2k	RD¼PS	222J
R2	Carbon film	2.2k	RD¼PS	222J
R3	Carbon film	4.7k	RD¼PS	472J
R4	Carbon film	4.7k	RD¼PS	472J
R5	Carbon film	240	RD¼PS	241J
R6	Carbon film	10	RD¼PS	100J
R7	Carbon film	15k	RD¼PS	153J
R8	Carbon film	5.6k	RD¼PS	562J
R9	Carbon film	100k	RD¼PS	104J
R10	Carbon film	10k	RD¼PS	103J

PIONEER® TX-9500 FV

FRONT END Ass'y AWB-023

ANTENNA

FM 75Ω UNBAL

300Ω BAL

GND

AM

Q_1 3SK45 Q_2 3SK45 Q_3 3SK39

IF OUT

AM VC AM VC AM VC

a b c

Q_4 2SC710
Q_5 2SC1342

Q_{11} HA1137

FM TUNING meter

SIGNAL meter

T_2 RED BLACK YELLOW WHITE BLUE

POWER INDICATOR 6V, 30mA STEREO INDICATOR 6V, 30mA

LAMP BOAD Ass'y AWX-081

8V, 300mA x4

D_8, D_9 1S2076 x2

Q_{23} HA1131

AC 7.5V

300mA 35mA

POWER SUPPLY Ass'y AWR-076

D_1 1S2473 D_6 1S2473

Q_1 2SC789 Q_2 2SC1318 Q_3 2SC945 Q_4 2SA733

D_1~D_4 S1B01-01 x4

WZ-061

BLUE GREEN BROWN GREEN T_1

AC 110/120/130/220/240V 50/60 Hz

AC OUTLET UNSWITCHED 200 WATTS MAX

FU4 0.5A

0V : WHITE
110V : YELLOW
120V : BROWN
130V : ORANGE
220V : RED
240V : GRAY

MPX Ass'y AWD-007

Q_1 HA1156

D_1 1S2076

Q_2 2SC945

Q_3, Q_4 2SA763P x2

25μS — 50μS — 75μS

FM AM IF Ass'y AWE-055

Q_1~Q_7 HA1211 x7

Q_{11} HA1137

Q_{23} HA1138

Q_{24} 2SC461

Q_{12} 2SC945

Q_{13} 2SC945

Q_{14} 2SA725

Q_8 M5109PR

D_{10}, D_{11} 1S188 x2

Q_{15}, Q_{16} 2SC711 x2

D_1 1S2076

D_2 1S2076

D_3 1S2076

D_4 1S2076 x2

D_5 1S2076 x2

D_6 1S2076 x2

D_7 1S2076 x2

D_8, D_9 1S2076 x2

D_{12} 1S188

Q_{22} 2SC711 x3

Q_{18}, Q_{19}, Q_{20}, Q_{22} 2SC711 x3

Q_{18}, Q_{21} 2SC945 x2

Q_9 2SA725

Q_{10} 2SC1312

Q_{17} 2SA720

Q_{10} 2SC945

Q_9 2SC945

Q_8 2SC945

Q_7 2SC945

D_2 1S2473

D_3 1S2473

Q_1 2SA725

Q_2 2SA725

Q_3 2SC1312

Q_4 2SC1312

Q_5 2SC1312

Q_6 2SC1312

D_1 1S2473

Reed relay

Q_{16} 2SA763P x2

S_1 - 2/3 R

S_1 - 2/3 F

S_1 - 3/3 R

S_1 - 3/3 F

S_1 - 1/3 F

S_3

OUTPUT LEVEL VOLUME 100K x2

OUTPUT

LEFT FIXED — 650 mV

RIGHT FIXED — 650 mV

LEFT VARIABLE — 70 mV ~ 2000 mV

RIGHT VARIABLE — 70 mV ~ 2000 mV

FM MULTIPATH

HORIZ

VERT

4CH - MPX OUTPUT — 400 mV

RESISTORS

IN OHM, 1/4W, ±5% TOLERANCE UNLESS OTHERWISE NOTED. K : KΩ M : MΩ

CAPACITORS

IN μF UNLESS OTHERWISE NOTED. P : pF

V : DC VOLTAGE

⇦ mA : DC CURRENT

mV : SIGNAL VOLTAGE AT 100% MOD.

SWITCHES

S_1 : FUNCTION
1. AM
2. FM AUTO
3. FM MONO
4. REC LEVEL CHECK

S_2 : MUTING
OFF — 1 — 2

S_3 : MPX NOISE FILTER
OFF ⟷ ON

S_4 : POWER
OFF ⟷ ON

S_5 : DE-EMPHASIS
25μS ⟷ 50μS ⟷ 75μS

AF OSC Ass'y AWK-040

Symbol	Description		Part No.	
R11	Carbon film	3.3k	RD¼PS 332J	
R12	Carbon film	100k	RD¼PS 104J	
R13	Carbon film	2.7k	RD¼PS 272J	
R14	Carbon film	3.3k	RD¼PS 332J	
R15	Carbon film	3.3k	RD¼PS 332J	
R16	Carbon film	2.7k	RD¼PS 272J	
R17	Carbon film	3.3k	RD¼PS 332J	
R18	Carbon film	3.3k	RD¼PS 332J	
R19	Carbon film	22k	RD¼PS 223J	
R20	Carbon film	10	RD¼PS 100J	
VR1	Semi-fixed	4.7k-B	C92-051-0	
VR2	Semi-fixed	100-B	C92-047-0	

SEMICONDUCTORS

Symbol	Description		Part No.	
Q1	IC	HA1156		
Q2	Transistor	2SC945-Q, R or S		
Q3	Transistor	2SA763P-5 or 6 (2SA725-F or G)		
Q4	Transistor	2SA763P-5 or 6 (2SA725-F or G)		
D1	Diode	1S2076		

FILTERS

Symbol	Description	Part No.	
T1	Anti-birdy filter	ATF-023-0	
T2	Anti-birdy filter	ATF-024-0	
F1	Low pass filter	ATF-016-0 (ATF-019-0) (ATF-028-0)	